# THE JOURNAL OF GAS LIGHTING
## WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LV. No. 1403.] LONDON, APRIL 1, 1890. [42ND YEAR. Price 6d.



**WOLSTON'S** Paste and Ready Mixed for Use.
Guaranteed Free from Adulteration. **TORBAY PAINTS.**
**FOR GASHOLDERS, &c., &c.**
**The Original "Torbay Paints"**
As supplied during many years to the LONDON GASLIGHT & COKE COMPANY.
*Illustrated Price List Post Free.*
**TORBAY & DART PAINT Co., Ld.,**
23, Gt. George St., Westminster, S.W.
DARTMOUTH, & BRIXHAM (TORBAY).

— ESTABLISHED 1830. —
**PARKER & LESTER,**
Manufacturers & Contractors.
THE ONLY MAKERS OF
**PATENT ANTIMONY PAINT,**
**Parker's Imperial Black Varnish,**
*Oxide Paints, Oils, and General Stores for Gas and Water Works.*
WORKS:
ORMSIDE STREET, OLD KENT ROAD, LONDON.
**Ashmore, Benson, Pease, & Co., Ld.,**
STOCKTON-ON-TEES,
Manufacturing Gas Engineers.
*See Advertisement, p. 615.*

**CEMENT**
**EARLE'S**
BEST
**Portland Cement**
MANUFACTURED BY
**GEO. & THOS. EARLE,**
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Office: 7, PIER STREET.
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STOREAGE CAPACITY 10,000 Tons.
ESTABLISHED 1811—OVER THREE QUARTERS OF A CENTURY.
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Manufacturers & Patentees of every Description of
**IMPROVED LAMPS**
FOR
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*WHOLESALE DEPOT: 52, COMMERCIAL ST., LONDON, E.*
*We specially solicit Government and Local Board Contracts for General Lighting.*

# FUEL ECONOMY.
# MELDRUM'S PATENT FURNACES
RAISE STEAM BY BURNING
**BREEZE, COAL DUST,**
*AND OTHER SMALL AND POOR FUEL.*
Telegrams: "Meldrum Manchester."
REALIZED SAVING UP TO
Results Guaranteed.
**£200**
**PER BOILER PER ANNUM.**
**MELDRUM BROTHERS,**
26, HALF STREET, CATHEDRAL YARD, MANCHESTER.

# DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

## GASHOLDER & BOILER WORKS,

**WEST BROMWICH, NEAR BIRMINGHAM**

(ESTABLISHED 1765),

## MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

*PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,*

**Wrought-Iron Roofs, Bridges, Girders, &c.,**

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

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TELEGRAPHIC ADDRESS: "COCKEY'S FROME."

# EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

**Gas Engineers and Contractors for the Erection of Gas-Works.**

MANUFACTURERS OF IMPROVED GAS-EXHAUSTING APPARATUS.

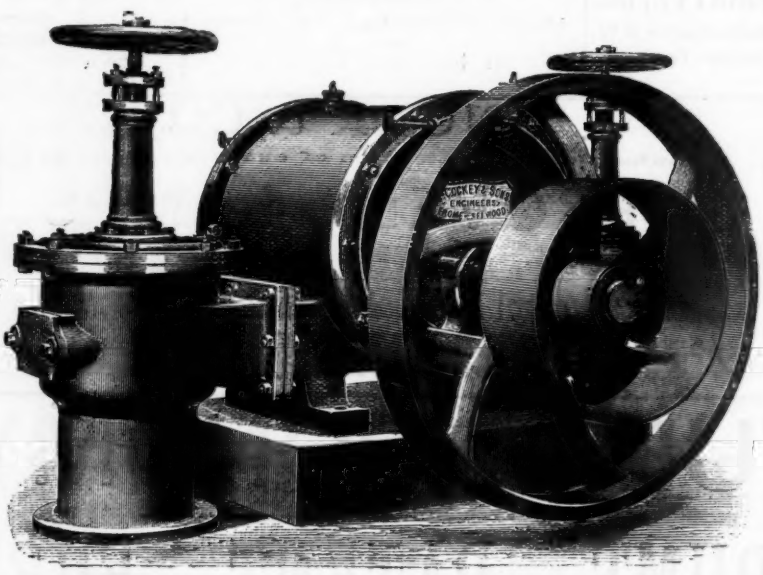
*A Large Stock of Valves always on hand.*

*Lamp Columns; various patterns.*

*Wood Grids for Purifiers and Scrubbers.*

*Castings of every description.*

*Apparatus for the manufacture of Sulphate of Ammonia.*




*Experienced Retort-Setters constantly employed.*

*Lead Burning and Plumbing in all its Branches.*

*Gas-Fittings in great variety.*

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(ESTABLISHED 1822)

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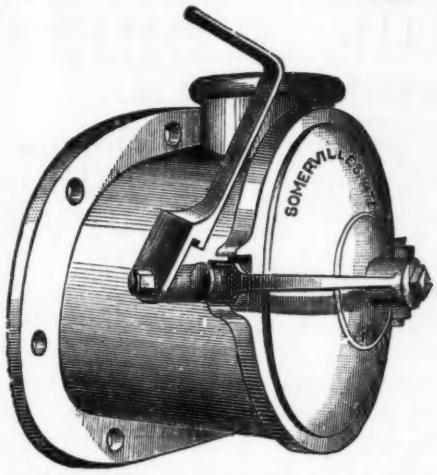


## GASHOLDERS AND GAS APPARATUS,

INCLUDING

RETORTS AND FITTINGS, PURIFIERS, VALVES, PIPING, SCRUBBERS, CONDENSERS, WASHERS, &c., &c., &c.;

GASHOLDER TANKS IN CAST AND WROUGHT IRON;

*GOLIATH, HYDRAULIC, AND OTHER PURIFIER COVER LIFTS,*

ALL OF THE MOST APPROVED DESIGNS.

BOILERS, ENGINES, PUMPS, EXHAUSTERS, METERS, GOVERNORS, &c.

SULPHATE OF AMMONIA PLANT.

MAKERS OF

SOMERVILLE'S PATENT RETORT MOUTHPIECES & LIDS,

WHICH ARE SELF-SEALING AND REQUIRE NO LUTING.

Prices and further Particulars may be obtained on application.

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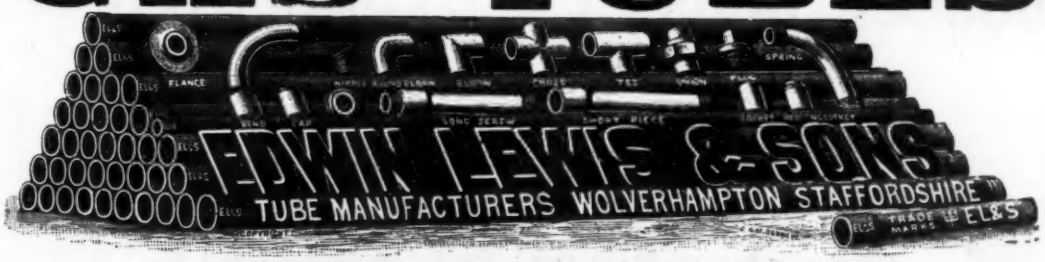
# GAS TUBES

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FOR ANY PURPOSE.

# NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

MANUFACTURERS OF

SLIDE VALVES, WITH RACK & PINION, OR Internal or External SCREWS, of all Sizes.

GASHOLDERS, AND Gasholder Tanks.

CAST-IRON RETORTS,

RETORT-BED FITTINGS,

*And Retort-House Appliances*

of every description.

Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

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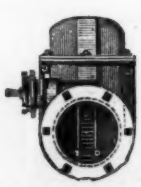
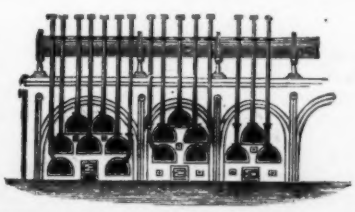
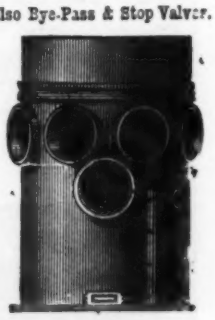
PATENT CENTRE VALVES

for working Purifiers.

Also Eye-Pass & Stop Valves.







PURIFIERS with Planed Joints,

HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS.

WOOD GRIDS.

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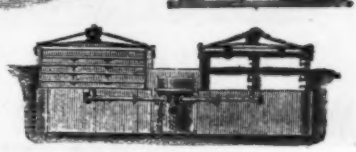


DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

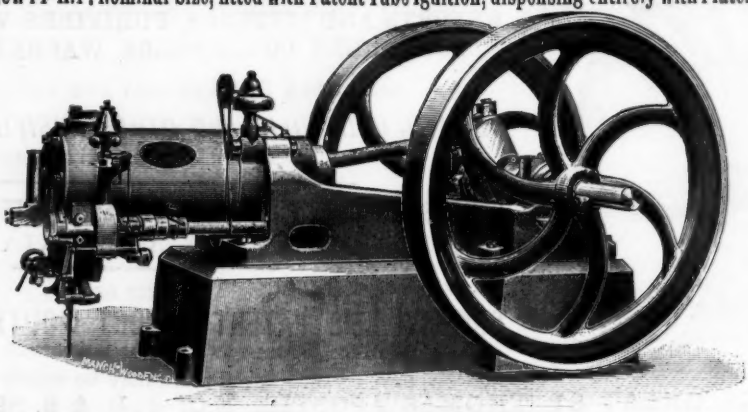
Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

## GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

# CROSSLEY'S "OTTO" GAS-ENGINE.

**100 Prize Medals.**

New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



**MADE in SIZES** *2-Man to 100-HP.*

**GAS-ENGINES** COMBINED WITH **PUMPS** FOR TOWNS SUPPLY, SEWAGE, &c., &c.

**GAS-ENGINES** COMBINED WITH **AIR COMPRESSORS** FOR THE SHONE SEWAGE SYSTEM, LUCIGEN LIGHT, &c.

**MADE in SIZES** *2-Man to 100-HP.*

VERTICAL AND HORIZONTAL TYPES.

**ENGINES** *COMBINED* WITH HOISTS, PUMPS, DYNAMOS, &c. &c.

*Largely used for EXHAUSTING, PUMPING, COKE CRUSHING, ELECTRIC LIGHTING, &c., &c.*

**Over 31,000 "OTTO" ENGINES are at work.**

**CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,**

LONDON, LIVERPOOL, GLASGOW, NEWCASTLE, BIRMINGHAM, HULL.

## HARRIS & PEARSON,

**STOURBRIDGE, ENGLAND.**

MANUFACTURERS OF

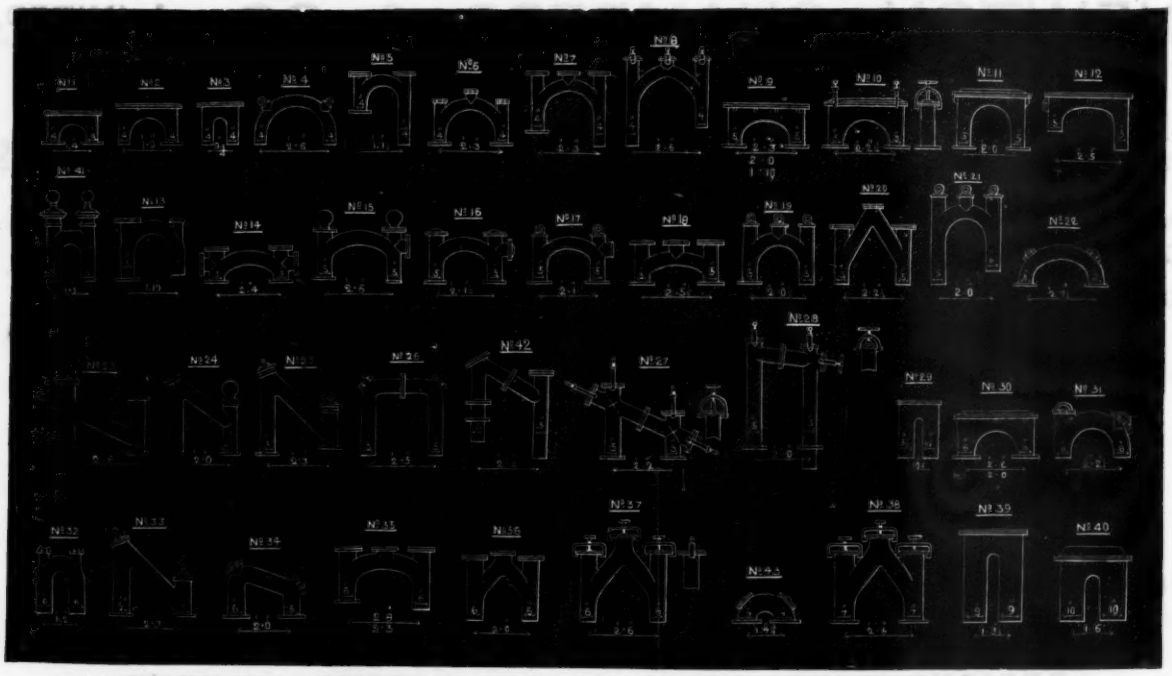
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

# R. & J. DEMPSTER,

## Engineers, Ironfounders, and Contractors,

GAS PLANT WORKS, NEWTON HEATH, MANCHESTER.



## ARCH, BRIDGE, OR H PIPES.

Any of the above patterns can be made with either flange or spigot ends and with faced flanges or turned and bored plugs if required.

*Designs Nos.* 26, 27, 28, *and* 42 *can be altered to any desired span without extra charge. Other variations by arrangement.*

**Patterns for special designs or spans made to order.**

# JOSEPH CLIFF & SONS,

INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.,
WORTLEY, LEEDS.

LONDON Offices & Depôts:
*Baltic Wharf, Waterloo Bridge.*

WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.

LIVERPOOL:
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## MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

**Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.**

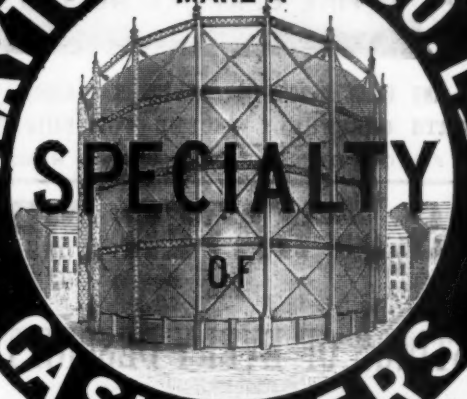
ESTABLISHED MORE THAN A QUARTER OF A CENTURY

WORKS
HUNSLET,
LEEDS

LONDON OFFICE:
60, QUEEN VICTORIA STREET
E.C.

CLAYTON SON & CO. LTD.

MAKE A



SPECIALTY OF GASHOLDERS

AND MAKERS OF

REG.ᵈ TELEGRAPHIC ADDRESS: "GAS LEEDS"

GAS PLANT OF EVERY DESCRIPTION.

# JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD,

# ALDWARKE MAIN GAS COAL.

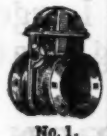
This Coal yields 12,600 feet of 16-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

# R. DEMPSTER & SONS, Ltd.,

ESTABLISHED 1855.

## ROSE MOUNT GAS ENGINEERING WORKS,

## ELLAND.

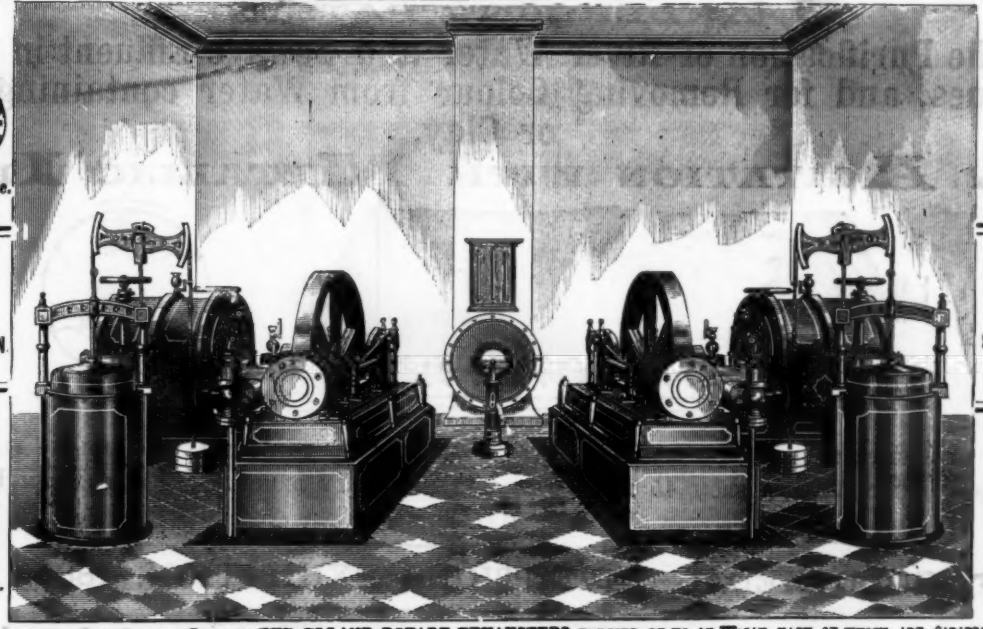


No. 1.
Flange Valve.

No. 5.
Screw Valve.

NO SLIP.

NO OSCILLATION.



NO HIGH SPEED.

STEADY GAUGE.

No. 3.
Screw Valve.

No. 6.
Disc Valve.

THE ABOVE IS AN ILLUSTRATION OF A PAIR OF THE ELLAND ROTARY EXHAUSTERS ERECTED BY US AT WIGAN, EACH OF WHICH ARE CAPABLE OF PASSING 80,000 CUBIC FEET OF GAS PER HOUR.

Makers of every other description of Gas Plant, including Retorts, Retort Mountings, Condensers, Washers, Tar and Liquor Separators, Scrubbers, Purifiers, Gasholders any size, Patent Centre-Valves, Four-Way Valves, Rack, Screw, and other Valves.

**Testimonials and References on Application to**

# DEMPSTERS', ELLAND.

# JOHN HALL & CO.,

**STOURBRIDGE,**

**MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,**

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
RETORTS CAREFULLY PACKED FOR SHIPMENT.
A STOCK OF DIFFERENT SHAPES ON HAND.

# GAS AND WATER PIPES

AND

# CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

# CLAY CROSS COMPANY,

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# SULPHATE OF AMMONIA.

By Her Majesty's Royal Letters Patent.

# DR. FELDMANN'S APPARATUS

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES APPLY TO THE

Sole Agents and Manufacturers,

## GODDARD, MASSEY, & WARNER,

## ENGINEERS,

## NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT, BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (4 Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
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And to the following Gas Companies and Corporations:—

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| ILKESTON. | BURY. | CHORLEY. |
| WIDNES | BRIGHOUSE. | WHITEHAVEN. |
| HALIFAX. | MARKET HARBRO'. | CHESTER. |
| ALTRINCHAM. | PRESCOT. | SOUTH SHIELDS. |
| DENTON. | SOWERBY BRIDGE. | LEEK. |
| ST. ALBANS. | LEICESTER. | IPSWICH. |
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| NORTHWICH. | NELSON. | SALFORD. |
| HUDDERSFIELD. | ORMSKIRK. | LUTON. |
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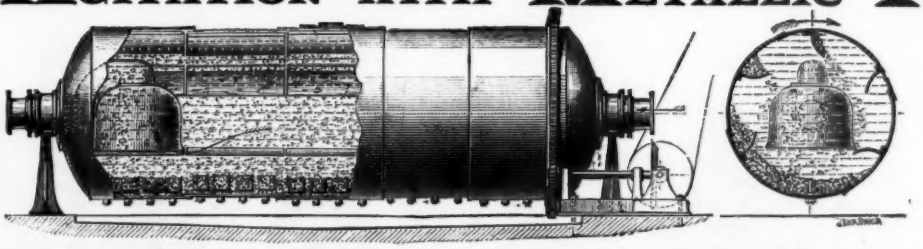
# THE REVOLVING PURIFIER

(ANDERSON'S PATENT)

**For the Purification of River Water and Sewage Effluent in Large Volumes, and for Removing Colour from Water containing Peat or Clay,**

**By Agitation with Metallic Iron.**



Made in fourteen sizes; capable of treating singly 5000 to 1¼ million Gallons per Day. Reduces Organic Matter from 45 to 90 per cent.; totally removes Microbes from Polluted Water.

GOLD MEDAL, INVENTIONS EXHIBITION, 1885.

# Revolving Purifier Company, Limited,

## DOCK HOUSE, BILLITER STREET, LONDON, E.C.

# KIRKHAM, HULETT, & CHANDLER, Ld.,

**PALACE CHAMBERS,**

## 9, BRIDGE ST., WESTMINSTER.

**Mr. S. HERSEY, Managing-Director.** **Mr. J. CHANDLER, Engineer.**

# THE "NEW" PATENT

# "Standard" Washer-Scrubber,

As supplied to and in course of construction for numerous Gas-Works. (*See previous Advertisements.*)

**Thoroughly extracts every grain of Ammonia and a large quantity of other Impurities from Gas.**

Has been for many months in successful and satisfactory operation at **The Gaslight and Coke Company's Station at BECKTON** (*vide* Testimonial).

*The Gaslight and Coke Company, Horseferry Road, Westminster, S.W.,*
*Nov.* 25, 1889.

Messrs. KIRKHAM, HULETT, AND CHANDLER, LTD.,

GENTLEMEN,—In reply to your enquiry respecting the result of putting Wooden "Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say that they have answered admirably for the few months they have been in; and I think them a decided success.—I am, yours truly,

(Signed) G. C. TREWBY.

1. The weight in motion is **only one-seventh** of that in the present Machine.
2. It requires **only one-seventh** the power to drive; consequently effecting a large reduction in cost of Engine as well as in steam power.
3. **The Wear and Tear is enormously reduced,** as the Shaft has comparatively little weight to carry.
4. It has been found that the washing surfaces **keep perfectly clean** and free from deposit from end to end of the Machine.
5. It is so constructed that it forms a most powerful, effective, and complete system of purification, gives no pressure, and can be removed and replaced without trouble or injury.
6. The "New Standard," owing to the foregoing, can be supplied at **a large reduction in price.**

Engineers desirous of working Ammoniacal Liquor over and over again prior to leaving the "New Standard" can do so by the automatic and simple arrangement which forms part of this Patent.

*The Apparatus can be applied to "Standard" Washer-Scrubbers already in use.*

## THE "STANDARD" TAR, $H_2S$, & $CO_2$, EXTRACTOR.

This Apparatus has been in operation some considerable period at the **Avon Street Station of the Bristol United Gas Company,** where it has been thoroughly tested, and found to give entire satisfaction. Drawings and particulars on application. (*Address as above.*)

**TESTIMONIAL.**

*Bristol United Gaslight Company, Avon Street Station,*
*Dec.* 2, 1889.

Messrs. KIRKHAM, HULETT, AND CHANDLER, LTD.,

GENTLEMEN,—In reply to your enquiry as to the efficiency of the "Standard" Tar and Impurity Extractor fixed at this Station, I have pleasure in informing you that, ever since the apparatus has been at work, it has given entire satisfaction, as it removes every particle of Tar and a large proportion of $H_2S$ and $CO_2$, the additional back pressure being only one inch.—I am, Gentlemen, yours truly, (Signed)

E J. LLOYD.

*Sole Manufacturers of*

## GREENAWAY & KITT'S

# Patent Four-Slide Exhauster and Pump.

The most perfect and simple Gas Exhauster, there being no perceptible Oscillation or Variation, and a constant pressure with a steady Gauge maintained on the Outlet.

**☛ ADDRESS AS ABOVE. ☚**

# R. LAIDLAW & SON.

## IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES.

**Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions,**

INTERNATIONAL EXHIBITION, EDINBURGH, 1886.

MAKERS IN EDINBURGH OF

**STATION METERS, ALL SIZES**
**GOVERNORS,**
**PRESSURE REGISTERS**
*(To Indicate New Time),*
**PRESSURE GAUGES,**
**TEST GASHOLDERS**
**TEST METERS,**
**SIEMENS' WATER-METER,**
**ALL KINDS OF GAS APPARATUS & FITTINGS.**

MAKERS IN GLASGOW OF

**CAST-IRON PIPES, ALL SIZES**
**LAMP PILLARS,**
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**PUMPING ENGINES FOR WATER-WORKS,**
**BEALE'S GAS EXHAUSTERS,**
**WROUGHT-IRON TUBES AND FITTINGS,**
**BEAMS, COLUMNS, TANKS, &c.**

**Wet and Dry Meters of every description repaired, altered, and adjusted, at prices which we shall be pleased to furnish on application.**

**A LARGE STOCK OF METERS ALWAYS READY FOR IMMEDIATE DELIVERY OR SHIPMENT.**

*Descriptive Price Lists, Estimates, & full particulars forwarded on application.*

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

# TANGYES LIMITED,

CORNWALL WORKS, BIRMINGHAM.

DEPÔTS AT

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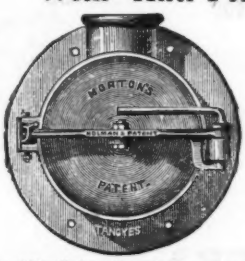
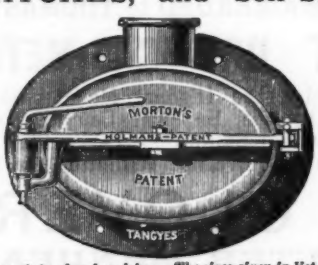
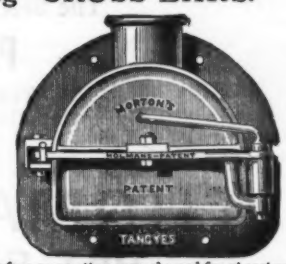
NEWCASTLE-ON-TYNE ST. NICHOLAS BUILDINGS
MANCHESTER . . . . . DEANSGATE
GLASGOW . . . . . ARGYLE STREET

Sole Makers of **MORTON'S** Patent Self-Sealing **RETORT-LIDS,**

With Anti-Friction CATCHES, and Self-Sustaining CROSS-BARS.




*Price of Mouthpieces depends on number required, which please state when inquiring. The sizes given in list we have patterns for; new patterns are charged for at cost price.*

These Patent Retort Lids and Fastenings are in extensive use in most of the Gas-Works in Great Britain, America, and on the Continent, and have almost entirely displaced the older method of sealing by a luting of lime or other material. The Lids are made in three forms, D, oval, and round (as shown above), in each of which we have a very extensive variety of patterns, from which Gas Engineers contemplating the adoption of these lids are recommended to make their selection, in order to avoid cost of pattern making, delays, &c., &c.

**Mouthpieces with Circular Lids for Oval Retorts.**

| Pattern No. | Diam. Mouth. | Internal Dimensions of Retort. | Length of Mouthpiece. | PRICE, Lid and Fittings without Mouthpiece. |
|---|---|---|---|---|
| 13658 | 14 ins. | 14 × 12 ins. | 15 ins. | £0 19 0 |
| 4356 | 14 „ | 18½ „ 12 „ | 12½ „ | 0 19 0 |
| 6851 | 15 „ | 16 „ 14 „ | 18 „ | 1 0 0 |
| 3629 | 15 „ | 18½ „ 13½ „ | 14 „ | 1 0 0 |
| 3580 | 15 „ | 21 „ 15 „ | 15 „ | 1 0 0 |
| 6264 | 16 „ | 18½ „ 15½ „ | 15½ „ | 1 1 0 |
| 5210 | 16 „ | 20 „ 14 „ | 15 „ | 1 1 0 |
| 6263 | 16 „ | 24 „ 16 „ | 13½ „ | 1 1 0 |
| 5370 | 17 „ | 20 „ 14 „ | 14 „ | 1 3 0 |
| 6832 | 17 „ | 20 „ 14 „ | 17 „ | 1 3 0 |
| 6183 | 17 „ | 20 „ 15 „ | 15 „ | 1 3 0 |
| 4289 | 17 „ | 21 „ 15 „ | 14 „ | 1 3 0 |
| 5270 | 17 „ | 22 „ 14 „ | 14 „ | 1 3 0 |
| 3631 | 18 „ | 18 „ 14 „ | 20 „ | 1 5 0 |
| 3681 | 18 „ | 21 „ 14 „ | 13½ or 15 „ | 1 5 0 |
| 3554 | 18 „ | 21 „ 15 „ | 14½ „ | 1 5 0 |
| 7957 | 18 „ | 22 „ 16 „ | 14 „ | 1 5 0 |
| 8048* | 19 „ | 25½ „ 15 „ | 18 „ | 1 8 6 |

**Mouthpieces with Oval Lids for Oval Retorts.**

| Pattern No. | Dimensions of Mouth. | Internal Dimensions of Retort. | Length of Mouthpiece. | PRICE, Lid and Fittings without Mouthpiece. |
|---|---|---|---|---|
| 9800 | 18 × 14½ ins. | 18 × 14½ ins. | 15 ins. | £1 5 0 |
| 9205 | 20 „ 12 „ | 24 „ 14 „ | 10½ „ | 1 10 0 |
| 10000 | 20½ „ 14½ „ | 23½ „ 14½ „ | 15 „ | 1 10 0 |
| 9680 | 21 „ 15 „ | 21 „ 15 „ | 15 „ | 1 12 0 |
| 10056 | 21 „ 14½ „ | 21 „ 14½ „ | 15½ „ | 1 12 0 |
| 13218 | 21 „ 15 „ | 21 „ 15 „ | 17 „ | 1 12 0 |
| 10514 | 22½ „ 15½ „ | 22½ „ 15½ „ | 18½ „ | 1 13 0 |
| 13766 | 20 „ 17 „ | 20 „ 17 „ | 15½ „ | 1 15 0 |
| 13269 | 24 „ 15 „ | 24 „ 15 „ | 16 „ | 1 18 0 |

190

**Mouthpieces for Round Retorts.**

| Diam. .. .. .. .. .. ins. | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|
| Price, Lid and Fittings without Mouthpiece £ | 0 19 0 | 1 0 0 | 1 1 0 | 1 3 0 | 1 5 0 |

**Mouthpieces with Circular Lids for D Retorts.**

| Pattern No. | Diam. Mouth. | Internal Dimensions of Retort. | Length of Mouthpiece. | PRICE, Lid and Fittings without Mouthpiece. |
|---|---|---|---|---|
| 5348 | 14 ins. | 14 × 13 ins. | 7 ins. | £0 19 0 |
| 3463 | 15 „ | 15 „ 13 „ | 14 „ | 1 0 0 |
| 6675 | 15 „ | 15 „ 14 „ | 12 „ | 1 0 0 |
| 3661 | 15½ „ | 15½ „ 13 „ | 12 „ | 1 1 0 |
| 13052 | 16 „ | 16 „ 13 „ | 18 „ | 1 1 0 |
| 5601 | 16 „ | 16 „ 14 „ | 15 „ | 1 1 0 |
| 6827 | 16 „ | 16 „ 14 „ | 17 „ | 1 1 0 |
| 4494 | 16 „ | 16 „ 14 „ | 14 „ | 1 1 0 |
| 3548 | 16 „ | 16 „ 15 „ | 12½ „ | 1 1 0 |
| 6677 | 16 „ | 16½ „ 13½ „ | 12½ „ | 1 1 0 |
| 9645 | 16 „ | 16½ „ 13½ „ | 12½ „ | 1 1 0 |
| 4434 | 16 „ | 17½ „ 14 „ | 14 „ | 1 1 0 |
| 6469 | 16 „ | 18 „ 14 „ | 15 „ | 1 1 0 |
| 9015 | 16 „ | 18 „ 14 „ | 18½ „ | 1 1 0 |
| 4327 | 16 „ | 18 „ 15 „ | 15½ „ | 1 1 0 |
| 8049* | 16 „ | 18 „ 15 „ | 17½ „ | 1 1 0 |
| 6137 | 16 „ | 20½ „ 13½ „ | 13½ „ | 1 1 0 |
| 5918 | 17 „ | 18 „ 14 „ | 14 or 17 „ | 1 3 0 |
| 5053 | 17 „ | 19½ „ 12 „ | 14½ „ | 1 3 0 |
| 7548 | 17 „ | 20 „ 13 „ | 15 „ | 1 3 0 |
| 6468 | 17 „ | 20 „ 16 „ | 15½ „ | 1 3 0 |
| 4316B | 17 „ | 21 „ 14 „ | 14 „ | 1 3 0 |
| 7975 | 17 „ | 21 „ 15 „ | 14½ „ | 1 3 0 |
| 13459 | 17 „ | 21½ „ 13½ „ | 15 „ | 1 3 0 |
| 12990 | 18 „ | 18 „ 15 „ | 15 or 19 „ | 1 5 0 |
| 7135 | 18 „ | 18½ „ 15 „ | 18 „ | 1 5 0 |
| 10221 | 18 „ | 18 „ 16 „ | 12½ „ | 1 5 0 |
| 4506 | 18 „ | 20 „ 13 „ | 19½ „ | 1 5 0 |
| 6470 | 18 „ | 20 „ 13 „ | 15 „ | 1 5 0 |
| 6818 | 18 „ | 20 „ 13½ „ | 17½ „ | 1 5 0 |
| 4083 | 18 „ | 20 „ 15 „ | 16 „ | 1 5 0 |
| 5306 | 18 „ | 20½ „ 14 „ | 13½ „ | 1 5 0 |
| 13295 | 18 „ | 20½ „ 14 „ | 19½ „ | 1 5 0 |
| 7356 | 18 „ | 20½ „ 13½ „ | 13 „ | 1 5 0 |
| 4569 | 18 „ | 21 „ 14 „ | 18 „ | 1 5 0 |
| 3628 | 18 „ | 21 „ 15 „ | 16 „ | 1 5 0 |
| 7640 | 18 „ | 22 „ 13½ „ | 13½ „ | 1 5 0 |
| 7971* | 20 „ | 20 „ 15 „ | 18 „ | 1 11 0 |

*Patterns marked * have Sockets at back to connect to Retorts; all the others are flanged. Patterns marked B have curved bottoms.* 191

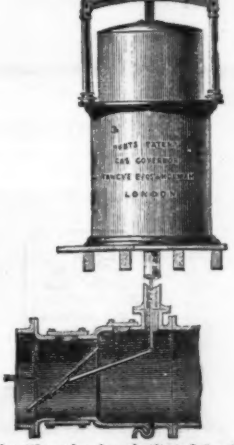
**Mouthpieces with D Lids for D Retorts.**

| Pattern No. | Dimensions of Mouth. | Internal Dimension of Retort. | Length of Mouthpiece. | PRICE, Lid and Fittings without Mouthpiece. |
|---|---|---|---|---|
| 12292 | 15½ × 13 ins. | 15½ × 13 ins. | 13 ins. | £1 2 0 |
| 9967 | 16 „ 14 „ | 16 „ 14 „ | 15½ „ | 1 3 0 |
| 13574 | 16½ „ 13½ „ | 16½ „ 13½ „ | 12½ „ | 1 4 0 |
| 9899 | 18 „ 12 „ | 18 „ 12 „ | 14 „ | 1 4 0 |
| 12980 | 16 „ 16 „ | 16 „ 16 „ | 18 „ | 1 6 0 |
| 13900 | 18 „ 13½ „ | 18 „ 13 „ | 15 „ | 1 6 0 |
| 9912 | 18 „ 13½ „ | 18 „ 13½ „ | 17 „ | 1 6 0 |
| 9962 | 18 „ 13½ „ | 18 „ 13½ „ | 16 „ | 1 6 0 |
| 10982 | 18 „ 13½ „ | 18 „ 14 „ | 15 „ | 1 6 0 |
| 11098 | 18 „ 14 „ | 18 „ 14 „ | 12 „ | 1 6 0 |
| 9492 | 20 „ 13 „ | 20 „ 13 „ | 15 „ | 1 10 0 |
| 9208 | 20 „ 13 „ | 20 „ 13 „ | 19½ „ | 1 10 0 |
| 10251 | 20 „ 13 „ | 20 „ 13 „ | 15½ „ | 1 10 0 |
| 12964 | 20 „ 13 „ | 20 „ 13 „ | 18½ „ | 1 10 0 |
| 9909 | 20 „ 13½ „ | 20 „ 13½ „ | 17 „ | 1 10 0 |
| 12969 | 19½ „ 15½ „ | 19½ „ 15½ „ | 14 „ | 1 11 0 |
| 13781 { | 20 „ 15 „ Front. | 21 „ 15 „ | 15 „ | 1 11 0 |
| | 21 „ 15 „ Back. | | | |
| 7692 | 21 „ 15½ „ | 21 „ 15½ „ | 16 „ | 1 11 0 |
| 12978 | 20 „ 16 „ | 20 „ 16 „ | 17 „ | 1 11 0 |
| 13252 | 20 „ 16 „ | 20 „ 16 „ | 18 „ | 1 11 0 |
| 13220 | 21 „ 15 „ | 21 „ 15 „ | 17 „ | 1 11 0 |
| 6977 | 21½ „ 13½ „ | 21½ „ 13½ „ | 18½ „ | 1 11 0 |
| 8976 | 21½ „ 13½ „ | 21½ „ 13½ „ | 18½ „ | 1 12 0 |
| 10497 | 21½ „ 13½ „ | 21 „ 13½ „ | 18½ „ | 1 12 0 |
| 8037 | 21½ „ 13½ „ | 21½ „ 13½ „ | 18½ „ | 1 12 0 |
| 9908 | 21½ „ 13½ „ | 21½ „ 13½ „ | 15 „ | 1 12 0 |
| 10404 | 21½ „ 13½ „ | 22 „ 14 „ | 18½ „ | 1 12 0 |
| 12410 | 21½ „ 13½ „ | 23 „ 14 „ | 12 „ | 1 12 0 |
| 13822 | 21½ „ 13½ „ | 23 „ 14 „ | 15 „ | 1 12 0 |
| 10515 | 22½ „ 13½ „ | 22½ „ 13½ „ | 13½ „ | 1 12 0 |
| 7924 | 24 „ 14 „ | 24 „ 14 „ | 15½ „ | 1 13 0 |
| 13807 | 24 „ 15½ „ | 24 „ 15½ „ | 16 „ | 1 14 0 |
| 9015B | 25 „ 14 „ | 25 „ 14 „ | 12½ „ | 1 14 0 |
| 10932 | 25 „ 14 „ | 24 „ 14 „ | 13½ „ | 1 15 0 |
| 12944B | 22 „ 16 „ | 22 „ 16 „ | 16 „ | 1 15 0 |

*Patterns marked B have curved bottoms.* 192

HUNT'S PATENT EQUILIBRIUM DIRECT MAIN

## GAS GOVERNOR.



In this Governor a throttle valve is substituted for the ordinary suspended cone; all external communication being avoided by placing the lever or radius arm inside the valve chamber upon the disc.

The disc is carried upon steel centres, upon which it is accurately balanced.

| | | | | | |
|---|---|---|---|---|---|
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| 5 „ .. 20 0 | 10 „ .. 33 0 | 16 „ .. 46 0 | 24 „ .. 72 0 | | |
| 6 „ .. 22 10 | 12 „ .. 38 0 | 18 .. 50 0 | 36 „ .. 130 0 | | |

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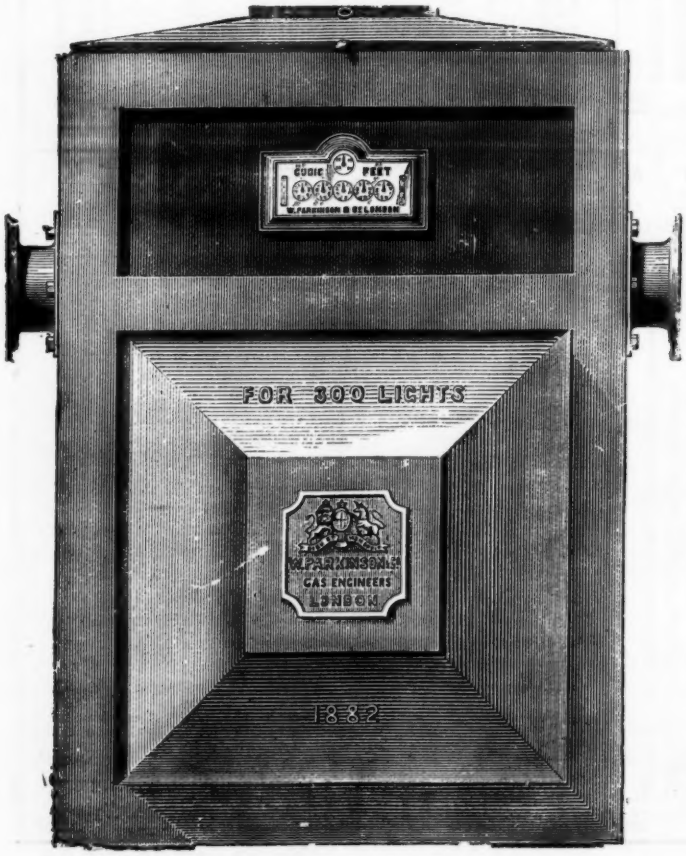


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THE

# JOURNAL OF GAS LIGHTING,

## WATER SUPPLY, & SANITARY IMPROVEMENT.

*TUESDAY, APRIL 1, 1890.*


### The Eight-Hour Shift and the Eight-Hour Day.

THE movement on the part of some Opportunist Socialists to secure the legislative restriction of adult male labour to eight hours daily, does not make any noticeable headway, notwithstanding the desperate attempts of some of its advocates to show that they are supported by the working-class vote. If anything had been required to expose the hollowness of this cry, it was supplied by a recent declaration from some of the self-appointed leaders of the so-called Labour Party, that the Eight-Hour Movement has in reality no more to do with a working day of eight than with a day of seven, six, or four hours. It is the peculiar boast of the Opportunist Socialists that there is no finality about their demands. They have set up the Eight-Hour Movement at present because they think it just possible to win the favour of politicians and voters by a term which can be illustrated by reference to gas-works and a few other industries which require relays of men to carry them on throughout the twenty-four hours. They confess, however, that there is no particular magic about the term of eight hours, and that they will be quite prepared to argue in the same way for a shorter working period, if what they call experience appears to them to render such a demand justifiable. Where this sort of thing is to stop nobody seems to know. The Socialist propagandist appears to recognize no bounds outside the opinions of a few hare-brained demagogues, whose panacea for all industrial ills is apparently legalized idleness. Since, however, it is the concession of the eight-hour day to gas stokers which is made to do duty as a support for such demands, it is well that this matter should be made clearly intelligible to outsiders, in order that it may be understood how the gas workers' eight-hour shift differs from what is demanded under the similar name of the Eight-Hour Movement. We shall try to set this out as briefly as possible.

It is, of course, impossible, within the limits of a short article, to descant upon all the bearings of the length of a working day upon the whole trade and industry of a nation. It is weary work to compare the British workman's week with the week of the Belgian, French, German, American, or Australian workman; and we are not disposed to essay it, even if our readers would be interested in the result. Volumes have been compiled upon this aspect of the labour question, and may be studied with advantage by the curious in the matter. All that we are concerned for at present is to show that the eight-hour shift in gas-works has no more connection with the working day of the mechanic and the yard labourer than has the four-hour watch of the crew of a collier. This is a point that must not be lost sight of, because it is the very core of the Opportunist demagogue's policy to pretend that the extension of eight-hour shifts to gas-stokers is an earnest of what is going to happen to all day labourers everywhere. It is impossible to say what may be the length of the regulation working day a few years hence; but if it is more or less than at present, the change will be brought about by very different means than argument on the example of gas stokers.

The alteration of the length of a working shift in an industry which has to be carried on throughout the twenty-four hours is obviously a different thing from a curtailment of the working day in a manufacturing business, which also means restriction of the output; and without positive evidence it would be difficult to believe that ostensibly sane persons can pretend, in public speaking and writing, to ignore this fundamental difference. The Opportunist demagogue, however, can only think of one thing—that to reduce the length of the working day means to provide employment for more hands; and he utterly ignores every other consideration. In the gas industry, the Eight-Hour Movement, where it was adopted, was simply a wages agitation more or less disguised. To obtain more money for his day's work is a natural desire of the workman everywhere; and to get the same money for less work is very nearly the same thing. It is well known that wherever during the past year the Gas Workers' Union prevailed upon stokers to ask for eight-hour shifts, this was understood to be only a step towards obtaining higher pay in addition. It was not the prospect of three or four hours' more idleness every day that roused the London stokers to enthusiasm; but the hope of getting another shilling a day into the bargain. Consequently, in many places the pretended short-time movement was directly translated into a request for more money, and when this was given all factitious discontent with the length of the working shift vanished.

The only allowable ground for legislative interference with industrial arrangements such as the length of a working day, is the interest of the community in general. However widely this justification may be interpreted, it cannot cover the demand for a statute forbidding able-bodied labourers to work at anything for longer than eight hours daily. The notion is, of course, an absurdity when closely examined; but it is never safe to depend on the absurdity of a project for its rejection. Only too often this is felt

to be ascertained by deplorable experience. There is not much prospect of the Opportunist Socialists being permitted to destroy the trade and industry of the country in their desire to find out by experiment how short a working day is needed to prevent the world from relapsing into barbarism. They may, however, create a great deal of trouble in their way, and spoil many a good, if weak man with their vaporous talk. To prevent this as far as our influence extends, we therefore insist upon the fact that the making of gas by eight-hour or twelve-hour shifts is merely a question of internal administration, and has no more bearing upon socialistic theories than it has on the weather. At present there is the disposition to raise the misleading cry: "See what the gas stokers have done; "they have gained the eight-hour day. Labourers all, "go and do likewise!" This is sheer nonsense, where it is not made downright wickedness by evil intent and wilful misrepresentation of the facts. There is all the difference in the world between a working *shift*, and a working *day*. The former is a question of wages only; the latter embraces wages, work, output, capital, profit, rent—in brief, the whole body of trade and industry. If this distinction is kept in view, it will not be possible for the manufacturer or trader to accuse the gas manufacturer of lending countenance and support to the Opportunist Socialist in the matter of the latter's clamour for an Act of Parliament in order to prevent men from working any more than eight hours a day.

### The Downfall of Ellis Lever.

THE career of the self-appointed Apostle of Purity in Commerce, Mr. Ellis Lever, has come to a most dramatic *finale*, in his condemnation at the Leeds Assizes to refund to the Corporation of Salford the sum of £2329 on account of illicit "commission" paid by him to Samuel Hunter when Manager of the Salford Corporation Gas-Works. If we were so disposed, what a piling-up of morals could be indulged in with reference to this truly striking bit of history! But we forbear. Never during the whole course of the events that began with Hunter's quarrel with Lever (which now appears to have arisen out of the circumstance that a goodly part of a promised commission was not forthcoming) to the present downfall of the latter, have we accepted Lever at his own valuation. He imposed his pretensions for a time upon many people as well as public journals, as certain impulsive individuals connected with the gas supply and other local affairs in Leeds, Halifax, Manchester, Salford, and elsewhere, must now confess with shame; but we never for one moment regarded them as anything else than a display of unbounded audacity. It would therefore be idle to treat the recent verdict as a surprise; the only wonderful thing about it is its dramatic completeness. While charging everybody who refused to buy coal of him (together with his rivals in trade) of venality, Lever must have depended for security from the exposure of his own, on the unwillingness of his partners in illicit transactions to denounce him at the cost of condemning themselves. One man—the man whom he had been instrumental in sending to prison—having fallen too low to fear further disgrace, has spoken out at last, and Lever collapses without attempting to say a word in his own defence. There is something pitiful in the sight of this man, exhibited before all men as even such a briber and corrupter of public servants as he had for his own selfish ends accused others of being. Let us dwell no more on the spectacle, which is not a pleasant one for any man who desires to preserve some respect for the humanity to which he belongs. With this *dénouement* the sorry farce of Lever's Purity Crusade ends for ever. As we declined to heap abuse upon the fallen Hunter for his weak acquiescence in the vicious practices that environed him, so we shall say little about Lever's practices as a seller of coal. In both cases, although the defrauding of the ratepayers of Salford was reprehensible, it is the superfluity of hypocrisy that sickens the observer. As for the trade system of which these men were such conspicuous practitioners, they are perhaps not worse in this respect than others who have not been found out. Illicit commissions, as has been frequently and abundantly admitted in the JOURNAL, have not always and everywhere been regarded as theft; and the practice of giving and receiving them is by no means confined to the gas industry. There has not for a long time been any excuse for misunderstanding the rights and wrongs of this matter, however; and if there remain any gas managers and coal agents who continue, after due warning, to act like Hunter and Lever, they will only have their own folly and greed to thank for any trouble that the future may bring them on this account. What respect can any man have for his character and reputation when he puts himself in the power of such a man as Lever? There is only one way of safety for those who have done this in times past, which is to resolve to do it no more for ever.

As to the conduct of the Corporation of Salford in this business, it appears to be only a shade less blameworthy than that of Hunter and his accomplice. The Corporation have been made agents for enabling Hunter to fleece business firms which had already paid blackmail to him; and in this way those who concluded the compact for the Corporation have betrayed a defective moral vision which almost explains Hunter's behaviour. It is impossible to imagine a high-minded public body readily consenting to such a compact with a convicted offender as that which, according to the evidence in this Lever case, was entered into by the Salford Corporation with Hunter. This part of the proceedings is as painful reading as anything connected with the whole affair. The one consolatory reflection upon this scandalous piece of business is that henceforth traders will probably be as shy of bribing public servants as the latter ought to be of putting themselves into the power of the former. If this is generally the result, Lever and Hunter will not have been punished only for their own good. What to say of the Corporation of Salford we cannot for the moment decide. Possibly their apologists might urge that, if they had not trafficked with Hunter, they would not have been able to obtain evidence for dealing with Lever and the rest; but is it positively certain that the same end could not have been attained by less questionable means? The Corporation owe it to themselves to make the necessity for their agreement with Hunter clear, if they look for any other and more honourable reward for their success in making Hunter and his accomplices disgorge than the amount of the money that will be recovered by this means.

### The Affairs of the Commercial Gas Company.

THE report of the Directors and the statement of accounts relating to the last half-year's working of the Commercial Gas Company have been issued, and will be found on another page. The general meeting will be held next Thursday. Dividends after the rates of 13¾ and 10¾ per cent. per annum are proposed, leaving £65,957 to be carried forward to the next account. These are the same rates of dividend that were paid at this time last year, when £60,492 was carried over. Comparison is thus easy, and shows that the prosperity of the Company has not been affected by anything that has happened to them during the past year. As curiously as unfortunately, the Directors have again to deplore the loss of their Chairman; Mr. Thomas Wrake Ratcliff having within the year followed to the grave his predecessor in office, Mr. Richard Bradshaw. Thus in the course of a few months the government of the Company has been twice changed. According to the accounts, the undertaking earned during the half year £161,787, as compared with £164,352 for the corresponding period of 1888, when the price of gas was 2d. per 1000 cubic feet higher. Coke did not bring in so much; but tar was £3779 better. On the other side, as was to be expected, gas manufacture shows a considerable rise; having cost £94,818 as compared with £87,369. Coals stand for £1834 of this, and wages have risen from £14,007 to £16,702. Repairs and maintenance, moreover, show a rise from £8893 to £11,396. The other entries do not call for any comment. In the statement of gas accounted for, an increase of upwards of 2¼ per cent. is to be discerned. The proportion of cannel carbonized shows a decided reduction, on which the management are to be congratulated. Altogether it would be difficult for the most carping critic to find fault with the condition of the Company as revealed by these accounts; and the new Chairman will have the satisfaction of succeeding to the control of a concern in as good condition, and with as sound a basis of prosperity, as any in the kingdom. With the appearance of the Commercial accounts closes the financial history of a twelvemonth's gas supply to the Metropolis; and it is not often that the year is richer in excitement and incident than that which has just been chronicled.

### Professor Lewes on the Spontaneous Combustion of Coal.

A most interesting paper on the "Spontaneous Ignition of "Coal," in ships' cargoes or in stores, was read before the Institution of Naval Architects on Friday last, by Professor Vivian B. Lewes. The purpose of the paper, which was admirably illustrated by experiments of a striking order, was, in the first place, to explain the origin of fires in coal cargoes and stores; and, secondly, to suggest a remedy. Professor Lewes proved convincingly that it is not to the pyritic impurities of coal that its tendency to fire spontaneously is due, but to its own tendency to absorb air and moisture. Other things being equal, he showed that a coal in bulk which contains much freshly-broken small, and has naturally a considerable power of holding moisture, is more likely to take fire than a naturally dry coal with little small, even though the latter should be highly pyritic. When coal is allowed to become damp, however, the pyrites rapidly decomposes with the water, swells, and so continually presents fresh surfaces of coal to be acted upon by the damp air. Evidently, from the rapidity with which the process of firing goes on when the temperature of the coal is once raised, it is of prime importance to check the heating as quickly as possible after its commencement. Professor Lewes proposes to effect this by scattering cylinders of compressed carbonic acid gas, sealed by fusible plugs, throughout the bulk of coal; but this suggestion will hardly please gas managers better than it did the naval architects on Friday. The most practical way that has yet been devised for meeting the difficulty of exceptionally inflammable coal is that of suspending from bottom to top of the mass vertical steam-pipes of (say) 2 inches diameter, perforated with a number of ¼-inch holes. The tops of these pipes stand above the surface of the mass of coal; and the idea is to sound them with a thermometer—or even smell the end—at regular intervals. If the pipes are planted thickly enough and well looked after, they give early indication of heating; and when this appears to be getting to a dangerous point, a flexible steam-pipe connection is attached to the end, and steam blown into the suspected region. We would recommend this device to Professor Lewes's attention. At the same time, it must be admitted that the paper now under notice throws much light upon an obscure subject, which is of immense importance to shippers and users of gas coal at home and abroad.

**The Managership of the Bromley (Kent) Gas Company.**—The appointment of Engineer and Manager of the Bromley (Kent) Gas Company, vacant by the death of Mr. G. H. Osborn, has been conferred upon Mr. W. Woodward, Engineer and Manager of the Bury Corporation Gas-Works.

**Death of Mr. Peter Anderson, of Santiago.**—From a letter just received from Santiago, we regret to learn of the death of Mr. Peter Anderson, the Manager of the gas-works in that city. The deceased gentleman was a son of Mr. George Anderson, and had held the appointment in Santiago for some years. About twelve months ago, Mr. H. T. Armit, of Northampton, left England to take the position of Assistant to Mr. Anderson.

**The Salford Scandal.**—Two matters arising out of the trial of the action brought by the Salford Corporation against Mr. Ellis Lever have been followed by unexpected results. The Trustees of Brunswick Chapel, Pendleton, held a meeting last Wednesday in reference to the statement as to the cheque for £50 being dropped into their collection box; and, feeling that a kind of stigma would attach to them if they retained this money, they at once subscribed it among themselves, and forwarded it by cheque to the Corporation. The statement made by Hunter, in the course of his evidence, that Lever had paid commissions to the late Mr. Peacock, the then Gas Superintendent of the Manchester Corporation, has aroused that body; and a Special Sub-Committee of the Gas Committee has been appointed to investigate the matter. It appears that young Peacock is in America; but it is believed that there are in Manchester several people who are in a position to give information to the Committee that will materially assist them. The Gas Committee have resolved that all contractors who have been, or may in the future be, proved to have given bribes to the employees of the Salford Corporation shall be struck off the list of persons tendering for material or labour required by the Manchester Corporation. Active steps are being taken by the Committee formed for promoting the petition for a parliamentary inquiry into the Salford scandal to have this matter thoroughly exposed; and at a meeting held last Friday it was decided to memorialize the Corporation to take or continue legal proceedings against every person or firm alleged to be implicated therein. They also wish to have the Hunter agreement annulled, and the release of every claim withheld until an official investigation has been conducted, and full restitution obtained.

## WATER AND SANITARY AFFAIRS.

The London County Council have a recommendation before them from their Special Water Supply Committee, of which Mr. James Beal is Chairman, proposing that they should introduce a Bill into Parliament during the present session, for the purpose of suspending the powers of the Metropolitan Water Companies, whereby the latter would be enabled to charge for the supply according to any increase in the rateable value of property as shown by the forthcoming quinquennial valuation. If the County Council seriously intend to take this step, it is to be hoped that Parliament will have too much respect for itself to pass any such Bill, or even to entertain it. The average return upon water-works capital in London is not yet so extravagantly high, as to demand an absolute revocation by Parliament of powers which it deliberately conferred upon the Metropolitan Water Companies with respect to the mode of charging for the supply. The Companies have abided by the terms of that settlement during years when the result was by no means advantageous to all of them. Parliament has not only decided as to the basis on which payment is to be made to the Companies for furnishing a supply, but the rate of charge is also fixed in the Special Acts under which the several Companies carry on their affairs. If the County Council are entitled to ask that the basis of the charge shall be less than the rateable value of the property, the Companies are equally entitled to ask that they may be allowed to charge more per cent. on the value. If one side of the bargain may be disturbed, why not the other? But in the worst of times no Company thought of charging more than the statutory rate. Now that dividends have risen, it is proposed, by "a responsible public authority," that Parliament shall break faith with the Companies, and abrogate a statutory right. Everything is to be changed under the heavens, to suit the purpose of the London County Council. The whole system of levying rates by that body itself is being disturbed; and if Parliament will only humour the fancies of this ambitious conclave, there is no saying to what lengths it will consent to go. The Various Powers Bill has astonished all parties; and it is not a little amusing to find the Court of Common Council resolving to oppose the measure. The spectacle of the two great public authorities of London fighting against each other in Parliament is certainly edifying—that is to say, it carries a lesson with it, showing how each will struggle for power. The City is particularly unlucky, as its ratepayers will have to furnish a portion of the funds expended by the County Council in fighting the Corporation. We have already remarked on the conflict of authority concerning the water supply; the County Council proposing one inquiry, and the Corporation another. The City Fathers, having failed to get the help and countenance of the Local Government Board in selecting an expert for conducting their proposed investigation, have, it is stated, procured Sir W. Guyer Hunter to preside over the Water Inquiry Committee. Sir W. G. Hunter is a high medical authority; but we are not aware that there is any doubt as to the excellent quality of the New River water. Perhaps there is some recommendation in the fact that Sir W. G. Hunter is member of Parliament for Central Hackney. If inquiry is wanted, and is fairly conducted, there need be no objection raised against it. But the "inquiries" of the Corporation and the County Council are clearly directed to a particular and partial issue, settled and defined beforehand. While the water supply is thus receiving special attention from the Local Authorities, it is quite possible that the ratepayers will soon be proposing—in respect to the County Council—an inquiry of another sort. The affairs of the Metropolis threaten to drift into confusion; and the attention of the public is likely to be taken up before long with other rates than those of the water supply.

**Mr. Alfred Cresswell,** the Gas Examiner at Birmingham, has been engaged by the Coventry Corporation to make a monthly test of the illuminating power of the gas supplied in the city.

**Mr. T. P. Travers,** son of Mr. Thomas Travers, Engineer and Manager of the Cork Gas Company, has been elected an associate member of the Institution of Electrical Engineers.

**Mr. F. G. Dexter,** Manager of the Wantage Improvement Commissioners' Gas-Works, has been appointed, out of something like 130 applicants, Assistant-Manager to the Winchester Water and Gas Company.

# ESSAYS, COMMENTARIES, AND REVIEWS.

## GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 608.)

THE general run of business on the Stock Exchange during the past week has not presented any very salient feature. The dulness so long persistent continued to prevail in the earlier portion; but after the settlement was got through, there was really some sign of a better feeling. Of course, with the Easter holidays staring us in the face, there is no scope yet for any marked improvement; but as soon as they are over, there is good reason, if the Money Market holds on as it is, to look for a considerable revival. The Gas Market has been quieter; and prices have been but little affected. Gaslight "A" has been moderately dealt in at steady figures, and looks firm. The quotation has recovered 1. Small business was done in the secured issues, at average prices; and the "H" is quoted 1 better. In South Metropolitans, several transactions were recorded in the "B" on Tuesday, at good steady figures; but all the quotations still remain very wide open. Nothing was done in Commercials, except a single deal in the debenture stock. The Company's accounts to the end of 1889 are now out, and may be regarded as very satisfactory; seeing what a troublous period they embrace. For it must be remembered that, although the Company had not to contend with a strike of their own men, yet the effect of the great Dockers' strike was to paralyze trade at the East-end for many weeks, and so to restrict the Company's business materially. In addition to this, they were affected, like all the rest of the Companies, by the general advance in cost of material and labour. Taking these matters into consideration, it is highly satisfactory to note that, in round numbers, they have earned the old rate of dividend which they wisely propose to declare. Turning to the Suburban and Provincial undertakings, a less gratifying report comes from the Alliance and Dublin Company, who have been heavily pressed by increased cost, especially of cannel (of which they use nearly 20 per cent.). In the result, they have to take nearly £3500 from the reserve fund to make up the dividend, and will raise the price of their gas by 3d. per 1000 cubic feet. The quotation of the shares has fallen ½. Foreign Companies are steady and unchanged. The Water undertakings have been moderately active; and changes in quotation are slight and somewhat capricious.

The daily operations were: Gas opened firm on Monday, as indicated by Gaslights. The "A" and "H" advanced 1 each. In Water, Grand Junction, which had been put up 1, was put down again. On Tuesday, there was moderate activity in Gas issues throughout the list, and everything was firm and steady, except for the drop in Alliance and Dublin. There was more business doing in Water; and Southwark ordinary rose 1. Wednesday was a quieter day in Gas; but there was no weakness in prices. Nothing at all was done in Water. On Thursday, a single transaction in Gaslight "A" was all the business marked. On Friday, Gaslight "A" was done at top price, and prices of other stocks were firm, but nothing changed. In Water, Southwark ordinary was put down 1½. The few transactions recorded in Gas on Saturday again indicated general firmness. The only dealings in Water were in New River, and at good figures.

## ELECTRIC LIGHTING MEMORANDA.

### The Affairs of the London Electric Supply Corporation—A Heavy Penalty—The Contracts for the Electric Lighting of the City of London.

THE Directors of the London Electric Supply Corporation, Limited, have issued their report on the past year's working of the undertaking; and the annual meeting was held yesterday. The report covers a great deal of ground, and deals with so many important matters that it is very difficult to choose one for first mention. The retirement of the Earl of Crawford from the chair, in favour of Mr. J. S. Forbes; the pending application of the Corporation to Parliament for an extension of territory; the removal of the Grosvenor Gallery plant to the Deptford station; the partition of districts with the Metropolitan Electric Supply Company; and the proposed payment of a 6 per cent. dividend on the preference shares—all these are subjects calculated to provoke discussion, and of vital interest in their way. We cannot spare space for commenting upon all these topics and elucidating their bearing upon the fortunes of the undertaking; but will pass to the report of the Engineer (Mr. S. *Z.* de Ferranti). Here the first thing that strikes the reader is the statement that a great deal of work has been done at the Deptford station, including the erection of plant consisting of two 30,000-light dynamos, which is described as in complete working order. The Engineer goes on to admit, however, that the mains which were purchased and laid in the early part of last year for the purpose of conveying this supply of current to London have "proved a very great failure," owing to which not more than a quarter of the capacity of the Deptford plant can be utilized. The defective mains are to be taken up and new ones manufactured by the Corporation's own staff. It remains to be seen what the proprietors will think of this part of the report, which the Directors do not pretend to qualify as quite satisfactory. The Engineer concludes his statement by reminding the shareholders that, in fixing their works at Deptford, the Corporation have followed the example of the Gas Companies, who have found it desirable to make gas on a large scale on waterside sites. He claims that "when the Deptford works are further advanced, the wisdom of following an example proved to be so successful in an enterprise of a kindred nature will be apparent." A good deal, however, depends on whether the natures of the two kinds of undertakings are so akin that the experience of the one will serve for the other. At least, it may be said of the Gas Companies that they were successful in their small town stations before they built their large ones at a distance, and could gauge exactly what they stood to gain and lose by the change. But nothing of the sort can be claimed by electricians. From the accounts annexed to the report, it appears that the Company have a total paid-up capital of close on £660,000, of which they have spent £464,916. Out of this no less than £249,537 went for the purchase of the business of Sir Coutts Lindsay and Co., Limited—the Grosvenor Gallery installation—which is now at additional expense to be removed to Deptford. The revenue account applies exclusively to this installation, which brought in a gross return of £27,638. The working expenses were £26,389. Thus the profit balance on this comparatively old-established concern, which is admitted to be as fully developed as the limitations of the site of the works permit, is the magnificent sum of £1249! The details of the accounts will be found elsewhere. It will require genius of the Mark Tapleyan order to enable the Chairman or any proprietor to extract comfort and joy from these statements.

The settlement of the case of *Garman v. The Brighton and Hove Electric Light Company* will make a good many electricians feel uncomfortable; but the most uncomfortable of all who have not actually to pay the £800 compensation, with costs, awarded to the plaintiff in the Sheriff's Court, is probably Mr. W. H. Preece. This is the case of the Brighton brewers' engine-driver, who was killed a few months ago through accidentally touching a wire belonging to the local electric lighting company. It was a very pitiful case, for the sufferer was a young healthy man, a steady workman, and left a widow with six young children. While the matter was still *sub judice*, Mr. W. H. Preece distinguished himself by referring to the accident during the British Association meeting in Newcastle, in a manner that, according to a newspaper report, evoked "laughter and cheers" from his sympathetic audience. To give Mr. Preece and his auditory due credit, however, it should be stated that the merriment was not aroused over Mrs. Garman's bereavement, but by a remark of Mr. Preece to the effect that the man had been killed some hours after somebody had certified that the current was turned off from the wire in question. Mr. Preece was promptly brought to book for his exuberant partizanship on this occasion, and came off with so little credit that his public appearances as Apologist-General for electric light speculators, which were at one time so numerous as to be quite tedious, have since been very rare, if not absolutely stopped. To be condemned to pay £800 and costs for killing a man will be a steadying influence upon the Brighton Company, and this example will lead people everywhere to think more seriously than ever of the personal risks of electric lighting.

Matters are progressing, although not very rapidly, in connection with the electric lighting of the City of London by the Brush Company and the Laing, Wharton, and Down Syndicate, who control the Thomson-Houston system for this country. The reflection that they are not to have everything their own way has apparently cooled the ardour of the Brush people, who do not seem to be pushing the matter of the City lighting so fiercely as they did when it looked as though they were to be allowed to "walk over" for the prize. The subject of the lighting contracts has now been considered by the Commissioners of Sewers, who held a special meeting last Tuesday to receive the report of the Streets Committee on the proposed arrangements with the two tendering Companies. It has been agreed, among other things, that the contractor shall have a monopoly for 21 years for private lighting in their respective districts, whether the public lighting is determined or not; and that though the public lighting undertaking may be purchased by the Commission after 21 years, under the Act, the private lighting undertaking shall only be purchased after the same period by arbitration. After 42 years both undertakings are to be purchaseable under the Act. Certain concessions are made with regard to allowances in the accounts for depreciation, the formation of a reserve fund, &c.; and the Commission, on the whole, appear to have manifested great complaisance towards the electricians. Perhaps the latter will now set to work and make the necessary arrangements for carrying out their contract for the City lighting, which has been going begging for the past four or five years.

**Accidents with Petroleum Lamps.**—In connection with the subject of prospective petroleum legislation, Colonel Majendie, Her Majesty's Chief Inspector of Explosives, has received the report of the inquiry undertaken at his request by Sir F. Abel and Mr. Boverton Redwood, in order to ascertain the extent to which manufacturers of mineral-oil lamps have voluntarily adopted the suggestions for the construction of such lamps issued in 1885 by the Metropolitan Board of Works, on the basis of recommendations made by Sir Frederick and Mr. Redwood after their inquiry into the causes of lamp accidents,

## THE OXYGENATED OIL-GAS SCHEME.

BRIEF reference was made last week to the gas-making process invented by Mr. E. Tatham, of Balmain, New South Wales, an abstract of whose patent specification appeared in the JOURNAL for Jan. 21 last (p. 111). It was stated that the principle of this invention consisted in the admixture with carburetted hydrogen gas of a known proportion of oxygen, with the object of improving the combustion of the former, especially when very rich in illuminants; and a question was raised respecting the safety of such a mixture when prepared and used for lighting in the ordinary way. We are now enabled to lay before our readers an account of what is being done for the development of this remarkable process by the Company who have acquired Mr. Tatham's patent, working in conjunction with Brin's Oxygen Company, Limited, who, it is hardly necessary to premise, possess the only available system of producing oxygen on a scale and at a price to render the element suitable for industrial uses. The world has gone without free oxygen hitherto; and it is but reasonable to suppose that commercial uses for what is practically a new element will only be reached one by one, as the searchers out of new methods in the arts and sciences grow accustomed to the idea of being able to command an unlimited supply of pure oxygen at a reasonable cost. It is not an exaggeration to remark that of all possible applications of oxygen, that of putting it into a hydrocarbon gas, with a view to storing, distributing, and burning the mixture, will strike the average coal-gas manufacturer as one of the most questionable. The gas maker, like the physicist and chemist, has been accustomed to think of mixtures of oxygen with hydrogen, or a hydrocarbon gas, only as a blowpipe fuel, as a means for demonstrating the synthesis of water by exploding the mixture, or—in the case of the gas maker—as a device for facilitating coal-gas purification. Indeed, he can hardly yet be said to be familiar even with the latter method of utilizing oxygen in connection with coal-gas manufacture. It is making a severe demand upon the receptivity of the gas engineer to ask him to carry his mind at a jump from Mr. Valon's purification method, to a project for mixing a much higher proportion of oxygen with coal or oil gas, and to believe that this may be done with advantage to the light, heat, and power derivable from the hydrocarbon so treated, and without the slightest risk. It is at the last point that the technical inquirer will stick. Before he will consent to so much as discuss the effect of the proposed addition of oxygen upon the useful value of the gaseous mixture or the cost of such a process, he will demand first to be assured of the safety of the proposal, both in preparation and use, and under all conceivable vicissitudes of its employment. The fact that oxygen can form with coal or oil gas a highly explosive mixture, is quite enough to inspire initial distrust of all mixtures of the same components. It is idle to find fault with such a way of regarding Mr. Tatham's proposal; the only course to follow is to show that the explosiveness of a gaseous mixture —say, of coal gas and air, or coal gas and oxygen—is only a question of degree. Nobody dreads explosion as the result of adding 3 or 4 per cent. of air to the stream of coal gas entering a purifier; and Mr. Valon's oxygen process of gas purification is equally relieved of any such fear. In fact, when the subject is examined, however cursorily, it must be recognized that an explosion of gas can only occur when the air or the oxygen, as the case may be, is largely in excess of the hydrocarbon in a possible explosive mixture; whence it follows that such explosions almost always occur in rooms, partially opened apparatus, &c., and not in gas-pipes. The question of explosion in connection with the addition of air, or in the present case of oxygen, to a hydrocarbon gas, is therefore reduced to that of the margin between the proportion actually added to the gas and that at which the mixture becomes explosive. This again depends upon the purpose for which the addition is made. Mr. Tatham's motive for making the addition is to improve the illuminating value of the mixture. It follows that any excess of oxygen, being deleterious to the illuminating power of the mixture, would not be likely, especially as the oxygen costs money; and if accidentally produced, it would be immediately detected by the aid of a test burner. The exact proportion of oxygen in a gaseous mixture to give the best effect in the photometer, depends upon the original richness of the hydrocarbon, and may vary from 2½ per cent. with ordinary coal gas to 20 per cent. with the richest gas procurable by retorting petroleum. From three to four times this quantity of oxygen might be added to the hydrocarbon gas, however, before the explosion point would be approached; and long before this limit of safety had been reached, the illuminating power of the mixture would be seriously affected. Thus the margin of safety is claimed to be more than sufficient for all practical purposes.

The responsibility for this guarantee rests with Dr. Thorne, the scientific adviser of Brin's Oxygen Company, who investigated this part of the scheme before the Company would allow themselves to be connected with it. An experimental plant has been fitted up at the Westminster works of the Oxygen Company, where we saw last week oil gas burnt in the ordinary way which contained 30 per cent. of oxygen, or half as much again as would be added in practice to the richest oil gas. It will be evident that the utility of the process would be in connection with the development of light from the richest petroleum gas, that cannot ordinarily be burnt to advantage. The richest cannel gas that can be commercially distributed is, according to Scotch experience, of not more than 30-candle power measured at the works. This gas, when burnt from a No. 1 or No. 0 union-jet burner, is apt to smoke, and to clog the holes of the burner. Attempts have been made, chiefly in America, to sell 50 or 60 candle gas produced by retorting cheap petroleum oils and residuum; but the flame is too smoky to burn in air without a blast, which is unattainable. To dilute this gas with air is ruinous, and even when diluted with hydrogen and carbonic oxide, as in water-gas apparatus, the illuminating value is reduced in greater measure than the bulk is increased. Water gas, like "air" gas, is therefore only a device for letting down the high luminous power of oil gas to a manageable standard. Mr. Tatham's proposal is the direct contrary to this, inasmuch as he aims at rendering the richest oil gas not only manageable, but even superior in lighting power, by the addition of sufficient oxygen to ensure its burning completely within the compass of an ordinary union-jet flame.

The first step in the process now under notice is the production of the richest possible oil gas, which is done at the Westminster experimental station by subjecting petroleum to a not extreme heat in an iron retort. The result is the production from a gallon of oil of about 100 cubic feet of a mixture of hydrocarbon gases and vapours giving a nominal illuminating power of about 100 candles. By raising the heat, some of these vapours could, of course, be gasified, with an increase of 10 to 20 per cent. of volume of the product; but at a loss of from 30 to 40 per cent. of illuminating power. With the product as made, however, Dr. Thorne mixes 20 per cent. of oxygen; and he states that, so far as his means enable him to determine, this addition prevents the condensation of the petroleum vapours the presence of which contributes so greatly to the high illuminating power of the mixture. This mixture, when stored over water, seems to be practically permanent. It burns clearly and smokelessly from a No. 00, or No. 0 union-jet burner, or from a Pintsch's burner as used in lighting railway carriages. Its light then compares favourably on the photometer with that of ordinary London coal gas, burnt (under the same pressure) at the rate of 7 cubic feet per hour in a No. 6 burner of the same class. According to this test, the oxygenated oil gas is something over eleven times the value of the common coal gas. Of course, this comparison is only approximative; but it exhibits with sufficient clearness what the oxygen does for the oil gas, which otherwise would burn with too yellow and smoky a flame for use. If the proportion of oxygen is increased, the effect is to render the gas-flame whiter—slightly at the expense of its illuminating power. If, therefore, some of the hydrocarbons were condensed out of the gas in storeage or travelling through mains, so as to noticeably heighten the proportion of oxygen in the remainder, the effect would not be very detrimental. Dr. Thorne is assured that under no conditions could the condensation of hydrocarbons be so great as to leave the oxygen in excess, which it would require to be to constitute an explosive mixture in the mains and holder.

The commercial question remains to be considered. It is known, from the experience of railway companies with Pintsch's oil gas, that a gas of this kind can be made from petroleum at current prices for about 6s. per 1000 feet. The cost, however, like that of the oxygen to be used with it, must largely depend upon circumstances. It would not be an extravagant estimate to price the mixture of 80 per cent. of oil gas and 20 per cent. of oxygen at 7s. 6d. per 1000 cubic feet. Supposing, therefore, that some of the superior illuminating power of the mixture is treated as a "bonus," and not reckoned in the comparative value, it would appear that Mr. Tatham's gas ought to compare favourably with coal gas in most places. It is, of course, imprudent to attach conclusive value to mere laboratory trials and estimates in a matter of lighting; but here it at least appears that a *primâ facie* case has been made out by Dr. Thorne for a working trial of the Tatham system under conditions that would remove the uncertainties left by the Westminster experiment. Credit is due to the proprietors of the system for their good faith in placing the preliminary tests of the invention in reputable hands. They do not attempt to make a secret of anything about their apparatus, which is indeed of the simplest character. There is no mystery about the elements which must go to make the success of the scheme, or condemn it, as the case may be. They lie on the surface; and if there is any doubt in the mind of a reader of this description respecting one or all of these points, it can be stated to, and will probably be removed by, Dr. Thorne, of the Brin's Oxygen Company, who has implicit confidence in the scientific basis of the invention.

**Abandonment of Metropolitan Electric Lighting Schemes.**—At last Tuesday's meeting of the London County Council, it transpired that an intimation had been received from the Board of Trade that the following Electric Lighting Orders will not be proceeded with:—St. Martin's-in-the-Fields and Strand; St. Margaret and St. John the Evangelist, Westminster; City of Westminster Electrical Syndicate; St. Pancras Electric Supply. The first-named Order was applied for by Messrs. Gatti; the second, by Messrs. Renshaw, King, and Co.; the other two by the Syndicate named and by the House-to-House Company.

# TECHNICAL RECORD.

## SOUTH-WEST OF ENGLAND DISTRICT ASSOCIATION OF GAS MANAGERS.

The Twenty-fifth Half-Yearly Meeting of this Association was held at the New Swindon Gas-Works on Tuesday, March 11—the PRESIDENT (Mr. J. J. Jervis, Engineer and Secretary of the New Swindon Gas Company) in the chair. There was a large attendance of members, besides several visitors—including Mr. W. H. Ludgate, Chairman of the New Swindon Gas Company; Mr. A. G. While, a Director of the Company; Mr. Chandler, Chairman of the Old Swindon Gas Company; and Mr. John West, of Manchester.

As recorded in the abstract report of the proceedings at the meeting which has appeared in the JOURNAL, the first item on the programme was the inspection of the gas and tar works, under the guidance of Mr. Jervis; after which the members proceeded to the Board-room, where the business was transacted.

The PRESIDENT having taken the chair, the notice convening the meeting, and the minutes of the preceding meeting, were taken as read, on the motion of Mr. H. SAINSBURY (Trowbridge), seconded by Mr. J. H. CORNISH (Bridgwater).

### WELCOME TO THE ASSOCIATION.

The PRESIDENT then said they were honoured that morning by the presence of the Chairman of the Old Swindon Gas Company. A Director of the New Swindon Gas Company was also with them; and the Chairman of that Company would join the meeting in a few minutes. He was sure a few words from these gentlemen would be acceptable.

Mr. A. G. WHILE said that, as a Director of the New Swindon Gas Company, he was pleased to welcome the Association to their works, especially as Mr. Jervis had been selected President for the year. He trusted the future of gas companies might be better than the past had been—he meant the immediate past, for they had lately had a good deal to struggle with, on account of increased price of coal and the demands made by the workmen. However, they would no doubt pull through. With regard to the electric light, they had held their own. Not only had it failed to injure the gas business, but it had improved it by creating a demand for more light, some of which fell to the lot of gas. He recollected visiting, in company with his Chairman and Mr. Jervis, the Electric Light Exhibition held in 1882. They came back fully satisfied that the gas business would not be injured—at any rate, for many years; and they were still as fully convinced that the light would benefit rather than injure their industry. He trusted that, with increased care, and the improvements due to meetings such as the present, gas companies (and managers too) would prosper in the future.

Mr. CHANDLER said his recollection of gas went back farther than that of many present. He could remember having to trim the lamps, before gas was introduced at all. He had seen gas supersede oil, and hoped to live to see the day when the electric light would supersede gas, for the reason that he should thus get a long "innings." (Laughter.) No doubt it would attain a certain position; but it would do them no harm. On the contrary, it would put them on their best mettle.

Mr. T. HARDICK (Salisbury) said he was sure the proposition he was about to make would be well received. The Directors of the New Swindon Gas Company had entertained the Association, and also honoured the meeting by their presence; and he had pleasure in proposing that a hearty vote of thanks be accorded to them. Most of the members were only little people, who met to talk over their own little affairs; and, whatever people in larger towns might think, the meetings of the Association were beneficial and valuable to all concerned.

Mr. E. C. RILEY (G.W.R. Gas Department) said he would second the vote with great pleasure, as he happened to be personally acquainted with the gentlemen mentioned. New Swindon had grown and developed rapidly; and one of the signs of its advancement was that it should be able to entertain the Association as it had been entertained that day.

The proposition having been carried with applause,

Mr. W. H. LUDGATE acknowledged the vote, and expressed the hope that every member would spend an enjoyable day. It was true they had started in New Swindon in a very small way. He could remember when there was great difficulty in raising capital; but only a fortnight ago some of their shares sold for 100 per cent. premium. His Board were pleased that the Association had chosen to visit Swindon, and congratulated themselves on being present at the meeting. Formerly they had a difficulty in disposing of residuals, and were indicted for letting them run into the drains. Now they threw nothing whatever away, but utilized and sold all—sold at a fair price, too. So by economy in manufacture, and education of consumers, they hoped to continue prosperously. He thanked the Association for the hearty manner in which the vote had been carried, and hoped to see them again at no distant day.

### PLACE OF NEXT MEETING.

The PRESIDENT having invited suggestions as to the place for holding the next meeting,

Mr. D. IRVING (Bristol) said he had pleasure in proposing that the forthcoming meeting should take place in Bristol. He was sure that both Mr. Lloyd and himself would be happy to do all in their power to make it a success.

Mr. H. SAINSBURY seconded the proposition; remarking that Bristol was conveniently situated for the majority of the members.

The resolution was carried.

The PRESIDENT then delivered the following

### INAUGURAL ADDRESS.

Gentlemen,—I have very much pleasure in welcoming you to Swindon; and I thank you for the great honour of occupying the chair this day. But I am afraid you may have made a mistake, not only in choosing this town as your place of meeting, but also myself as President. For Swindon, simply as New Swindon, has of natural or artificial beauty no attractions whatever; nor have the gas-works anything in their simple, practical utility to admire. As for myself, I confess my inability to prepare such a presidential address as the office demands; but I trust that in the more generally accepted idea of the use and province of our Association and its meetings—viz., fuller interchange of ideas, inquiry for information, comparing notes, &c.—I shall have the indulgence of not being required to read you a scientific essay, but have the more pleasurable office of carrying out a programme that may make your visit to Swindon a very pleasant one.

In fact, one hardly knows where to find material for a presidential address; as, in all great matters of gas processes made public, the journals of the gas industry keep us well posted up, and the several events of interest to us are discussed for us in as many shades of opinion as there are periodicals. Consequently, one can speak of nothing new, unless he has worked out something for himself that might be of use to communicate. But I have not the opportunity, in so small a works as ours, of making experiments or working out processes that many of you have; and therefore I cannot report on anything tried and approved during the six months since our last meeting. Yet there is ample matter for me to suggest to you for excellent discussion, especially as I know there are present some who can give us valuable experience on some points to be mentioned; and so we shall spend our time far more profitably than would have been done by the reading of a scientific paper.

In the first place stands out most prominently the coal question. Greatly increased, and still increasing prices, and the difficulty sometimes experienced of getting any coal at all, are becoming most serious; and one could almost wish we could have the alternative of supplying for a time either electric light or water gas—Steenbergh or Lothammer. Raising the price of gas to meet the increased cost of coal will find about as much favour with consumers as lowering the dividends will with shareholders; and the ruling prices of residuals certainly give no favourable outlook for relief in this direction. Any expedient for obtaining a better yield of gas per ton of coal is therefore now of special interest. The Dinsmore process promises great things, and will be of immense value if ultimately proved to be successful in all points. The conversion of the hydrocarbons of the tar into permanent gases has long been a problem with gas engineers; and if the tar is as marketable after having been so deprived as it was before, it is certainly better than using the tar simply as fuel. It is not one of the stated objects of our Association; but, as doing a specific work, I should like to see a member deputed to get personally the best and fullest information possible on this or any other desired speciality, and make an independent report to us at our next meeting. As a set-off against the price of coal will be the selling price of coke; and any means of increasing the output on the one hand, and the sale of it on the other, will be welcomed. Tar firing in its stead does not pay now, at the present market value of tar; and the economy of regenerative furnaces for small settings is very problematical.

Reverting to the tar question for a minute or two, I shall quite understand that you are not so favourably impressed by the appearance of our tar-works as to entertain ideas at once of working up your tar yourselves; but I think gas companies should do so, equally as they work up their liquor—the plant and processes are as simple, and the returns as favourable. Both operations could be carried on in the same works, but perhaps best away from the gas-works. I know that, because of local circumstances, it may be better for certain gas companies to sell both liquor and tar; but generally the assumption holds good that, if it pays a manufacturer to buy the raw material, with all its attendant costs of transit, &c., it should pay the producer to work it up. Also, what is practicable in a large works is not always so in a medium or small works, because the cost of the apparatus requires a minimum of make upon which it shall be profitable. Especially as to the sale of liquor as against sulphate-making, any data from members present would be acceptable.

As coming within the province of increasing the "sold per ton," any information relative to improved main or service laying is desirable. The prepayment meter, and the fitting up of artizans' dwellings on very easy terms, may help to increase consumption; and the same result may also be attained by a shorter system of collection than the quarterly. Since July last, we have taken the indexes and rendered accounts monthly. It necessarily entails a large amount of extra work; but we

have some advantages in return. Every month we check out defective meters, and find leakages to attend to. We have also naturally three times as many complaints to hear. Still it brings us more in touch with our customers; and I have no doubt that we shall better understand each other, and eventually have less grumbling and more business, because of giving more attention. The collection of accounts is kept much closer together—a month only being due. For example, at the end of December the gas-rental due for the month, and arrears, was £987, as against what otherwise would have been £1725. We have only about 560 consumers; and our plan is to commence taking the meters on the first Monday in each month. The collector has details in his book, entered up as far as possible; and a man goes with him to read the meters. The account is made up on the spot, and often paid forthwith. A discount of 10 per cent. is allowed for payment within a period expiring on the third Monday in each month; all moneys being paid at the office of the Company. We thus receive not less than three-fourths of the amount due for the month a fortnight after date; and our house-to-house collection is thus very small. An account is also in arrear very much sooner; and is often handy so to be. The whole of the meters are taken and the accounts rendered in four days. I understand that at Stafford a weekly system of payment is carried out for cottage consumption; thus meeting oil consumption on one of its advantages—viz., "pay as you go."

But besides the coal problem, we have, in common with other industries, the labour question to face—one quite as unpleasant. I suppose everyone present has had, during the past six months, some phase of this problem to work out; and all of us have watched with deep interest the issue of the recent struggle between the South Metropolitan Gas Company and their employees. With respect to profit-sharing schemes of any kind, I know there are among those here assembled divers opinions. For myself, I think the sharing of profit is best left to the shareholders, whose capital is invested in the undertaking, and that the profit to the employee should be a simple question of the best possible wages for the work done. The bulk of workmen cannot remain so long on good work or good conduct for the receipt of a bonus to be ascertained or founded on a half-year's working, but prefer to draw balances on piece-work or profit-sharing at short intervals. "Payment by results" may be very good theory, but I have not found it good practice. I have paid weekly for the make per ton, but have found the plan to be a constant source of dispute. It is equally unpleasant working by giving a bonus for the make over the half year; and I can see no better way than the old-fashioned one of paying by the "turn." The shift of eight hours as against twelve hours must always be a question of circumstances. In the spring and autumn, the eight-hour plan works best with the number of charges to be made; at other times, the twelve-hour shift is preferable. But, on the whole, I think men like the longer period. There is more leisure between the charges, and I know the work is better done; and, as a rule, I believe it will be found that the long time off duty is not so profitable to the men, or so appreciated by them, as some may imagine.

But apart from turns, and bonuses, and profit-sharing schemes, we may, perhaps, be more agreed in our congratulations to those who won the battle in the recent gas strike. This will not be sympathizing with "capital" as crushing "labour," nor accepting all along the line the tactics of the Company; but it is approving of the firm stand made against the worst feature of modern trade unionism. As an outcome, however, of the strikes, we have forced upon us the problem of endeavouring, as far as possible, to reduce the labour requirement in all departments by the introduction of machinery and other processes in the retort and purifier house, &c. I cannot for myself relate any experience in power stoking; but I am glad that we are to have to-day an explanation of Mr. West's stoking machinery—the model on the table being a power machine for large or medium-sized works. We shall not have time to inquire much into Coze's plan of setting retorts, or Elliott's system of continuous carbonization; but information from anyone who may have seen either process will be esteemed. Both systems aim, by means of the inclination of the retorts, feeding at one end, and discharging at the other, to reduce labour; and they are therefore at the present time of special interest to us, as making us less dependent on shovel work in charging, which is, after all, an operation requiring more skill than a novice might think. In the purifier-house, too, much economy is being practised, although the most that can be done will not equal the increase per 1000 cubic feet for coal or labour; but as mitigating the unpleasantness of all purifier work, and also in some degree lessening the cost of labour, the subject is important. The adoption of Mr. Valon's oxygen process, although a proved success, may not be within the reach of many of us; but the air process is open to all. It is simple, wonderfully effective, and inexpensive, and has been adopted by several members of this Association, who can give us much valuable and interesting experience. For the past few months I have introduced air at the rate of nearly 2 per cent. by the use of an oiled-silk valve, similar to an air-pump valve. Some prefer a dip arrangement, to prevent back pressure on the meter, should the exhauster slow or stop; but the silk valve acts well. At any rate, the process is within reach of all who use an exhauster; and it should be adopted. But if, after all the economies we can effect, and the rates for coal and labour further advance, the price of gas has to be raised, I do not think the electric light will have any more 'vantage-ground on that account. How far it is advisable for gas companies to apply for powers to supply electricity may still be an indifferent matter with them; nor will they work both systems so long as the loss on one may have to be borne by the profits of the other.

But I must draw to a close, as much time will be required for your visit to the Great Western Railway works. Their private gas-works will be found worthy of inspection; and among other points of interest will be a double-lift gasholder 106 feet in diameter, with partial guide-framing. The tank is of concrete, and puddled; and the whole of the works, both tank and holder, have been carried out by the Company.

We are about to erect another gasholder—100 feet in diameter, single-lift—and are undecided at present as to whether we shall adhere to the old lines, or adopt the partial system; or Gadd's or Pease's. Mr. Gadd exhibited a model on his system to us at our Weston meeting; and the model on the table, with the photograph, illustrates Pease's wire-rope plan. We have received a tender which shows the cost to be about 20 per cent. less than on the old system, for the holder alone. There would also be quite 15 per cent. on the cost of the tank. The tying down for a single-lift holder is done by means of a wire rope fastened to the curb of the tank by an adjustable hook, thence passing vertically over a pulley fixed on the edge of the crown of the holder, and making a chord across the crown. It descends over a similar pulley to the underside of a tangential pulley fixed on the bottom curb of the holder, and is then brought up and made fast to the curb of the tank. The rope is made sufficiently taut by the adjustable hook; and as the holder rises and falls, the rope simply changes position. For a two or three lift holder the same principle is followed, but is not so simply applied; the system of ropes and pulleys appearing at first sight bewildering. A 40-feet holder has four ties; and for an 80-feet one, eight ropes, as shown on the photograph of the Haslingden holder, which, as the Engineer informs me, has behaved satisfactorily during the winter.

Mr. Dexter will kindly read a paper on gas-stove consumption; and I shall ask your opinion on the management of a district gasholder without a special main from the works. Therefore, gentlemen, I will not further encroach upon our limited time; and if I have failed in laying before you, in this address, matters sufficiently worthy, I hope that some of the points noted may suggest good discussion.

Mr. J. H. Cornish proposed a vote of thanks to the President for his interesting address, which, he said, teemed with useful hints and valuable suggestions, and would be an important addition to the transactions of the Association.

Mr. A. V. Daniel (Portishead) seconded the proposition, and it was carried with applause.

The President expressed pleasure at the way in which his address had been received, and said he hoped that at future meetings there would be some good papers or discussions on the points to which he had referred. He then called upon Mr. West to address the meeting, and explain the interesting models he had placed before them.

### West's Stoking Machinery.

Mr. J. West (Manchester), who was well received, said he was pleased to be present that day, and show his models in response to an invitation from the Committee of the Association, who desired to get information for the meeting on the subject of mechanical stoking. He proceeded to explain in detail the models, which comprised a set of manual power machinery.

The President asked if it was necessary to observe greater care in keeping the retorts clear of carbon, than where hand labour was used; also as to the cost of the apparatus.

Mr. S. W. Durkin (Southampton), referred to the increased make per ton claimed; and asked for some idea of what extent of increase might be expected (say) from Durham coal.

Mr. H. C. Shepherd (Old Swindon) thought that it would be difficult to adopt the system where the coal had to be wheeled some distance; and he asked if it could be applied with advantage to a make so small as 15 millions per annum.

Mr. J. H. Gray (Weston-super-Mare) said that some retort-houses were not high enough to afford space for the fixed hopper; and he would be glad to know if this objection could be met.

Mr. E. C. Riley asked if there was any chance of leaving a vacant space in the centre of through retorts.

Mr. West, in replying, said that the rubbing of the rake and the scoop greatly hindered the formation of carbon in the retort; and the retorts were not in any way damaged by the machines. Both the rake and scoop were from 1½ to 2 inches smaller than the section of the retorts each way; so that when enough carbon accumulated to interfere with the working, it was quite time to remove it. At Maidstone, where his machinery was used, the make per ton was 10,900 cubic feet; and at Portsea it was upwards of 11,000 feet. In all places where it had been introduced the result was an improved yield; but, of course, it was difficult to give a fixed increase. Some were, no doubt, doing very well without it; but he could say that all who used his machinery made largely and sold largely. At Maidstone there were 14 beds of sixes—through retorts—which required a double set of machinery. The cost varied,

according to the arrangement, from £1500 to £2000, including coal breakers and elevators. For single retorts, of course, a single set of machinery would do, the cost of which would not be much more than one-half these figures. The interest on capital, together with wear and tear, would not represent a very large sum per annum. Where the coal had to be conveyed some distance, he had introduced conveying machinery with advantage; and he could readily supply the coal hoppers from a store at one end, one side, or any position in respect to the retort-house. The machinery had been introduced with advantage in works making less than 20 millions—one man doing the drawing and charging; but it was questionable if it would pay in works much smaller. He had applied his system to all sorts of retort-houses; and where the roof was not high enough, he had carried the fixed hopper through it. Old-fashioned houses had many peculiarities; but most modern houses were quite large enough and sufficiently high. The charges put in at each end of a through retort would meet in the middle; so that there would be no vacant space unless there was intentional carelessness, just as there might be with scoop or shovel charging. This was the first opportunity he had had of explaining the models of his apparatus to a body of gas engineers; and he thanked the meeting for their interest and attention.

The PRESIDENT said he was sure that the Association greatly appreciated Mr. West's kindness in attending that day.

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Mr. F. G. Dexter (Wantage) then read his paper, entitled "A Method of Increasing the Consumption of Gas for Cooking and Heating Purposes." This, the discussion that followed, and the concluding business of the meeting, will be reported next week.

## EXPERIENCE WITH SUBSIDED GAS-MAINS.

By Wm. Drewry, of Cleethorpes.*

[A Paper read before the Eastern Counties Gas Managers' Association, March 19, 1890.]

The subject of this paper happily is not the every-day experience of gas managers; but there are times when all are more or less liable to subsidences of mains from various causes. In order to give you as clear an idea of my situation as possible, it is necessary to briefly describe the face of the country as it was supposed to be a long time ago, and also its present state.

First, its ancient condition. Cleethorpes was a small village, situated on the east coast of Lincolnshire, on a large clay cliff, one end of which is practically connected with the Wold Hills; far away to the west, the other end jutting far out into the River Humber, and almost directly opposite Spurn Point, on the Yorkshire coast. The next projection we find was Lock Hill, at Grimsby. Whether this was formed in making the old harbour or not does not affect my paper. It lies about three miles northwards. Between these two hills the coast-line fell back landwards for a considerable distance, and thus formed a large bay; and a stream (with a gravelly bottom) flowed through it, and there is to be seen to-day a sea bank, nearly a mile inland from high-water mark. Time and the action of the wild sea waves have gradually dismantled the beetling cliff, and carried it towards the bay, which, together with sand and gravel, have filled up and brought forward the coast-line almost straight with the two points before mentioned—its present state. A road was made across this filled up bay some 40 years ago, from Cleethorpes to Grimsby; and buildings sprang up, by degrees at first, afterwards rapidly.

The Cleethorpes Gas Company was formed for Cleethorpes. Grimsby being at that time almost as far from the new district as Cleethorpes, and, being another parish, a race took place between the two rival companies which should get there first, ending, of course, in a lawsuit, resulting in a parliamentary boundary, which meant to each, "thus far shalt thou come, and no farther," and here shall thy Bills be stayed. The name of the district was New Clee; but now it is in the borough of Great Grimsby. The Cleethorpes Gas Company laid a 5-inch main over 2 miles along the Grimsby Road; afterwards replacing it by an 8-inch—the one before you. As a proof that I am in the main correct in the description of the country, I do not hesitate to say that there are thousands of houses to-day standing on sea sand, and, of course, gas-mains laid in the same; also that water can be seen draining out of the gravel bed, and returning to the sea. When the tide is up, it flows inward through the gravel to some extent; and, of course, returns when the tide falls. There are several brickyards, out of whose pits black wood and parts of trees, and, I have been informed, even stags' horns are sometimes again brought to the light of day. Two years since, it was decided to lay a main sewer along the aforesaid road; and as the Grimsby Tramway Company had previously put down a single line in the centre of the road with numerous switches, it was, unfortunately for us, considered necessary to lay the sewer between the line and our main. In order to avoid the former with its traffic, our main was undermined for a considerable distance; and it was suspended in the most thoughtless manner—in fact, the main was more or less visible all along the road. At the point where the operations commenced, all unknown to us, from the above reasons, the gas supply was placed in the utmost jeopardy.

* In the absence of the author, who was indisposed, the Hon. Secretary (Mr. H. Wimhurst) read the paper.

Our Solicitor at once wrote to the Board calling their attention to the danger and responsibility, which had good effect for a while. All went well until the 8th of August, when the ground subsided some few hundred yards farther down the road. (See fig. 1.) This was over part of the bay before mentioned. It happened in this way: The trench was timbered, but not low enough. The ground was sand and gravel; and the trench made a deal of water, which had to be pumped out before any pipes could be laid, very few of which could be got in at once. By pumping the water and throwing out the loose sloppy sand and gravel, the latter began to purge out from behind the backings as the bottom of the trench was lowered; making still more room for the ground behind the timber to drop, which it did,

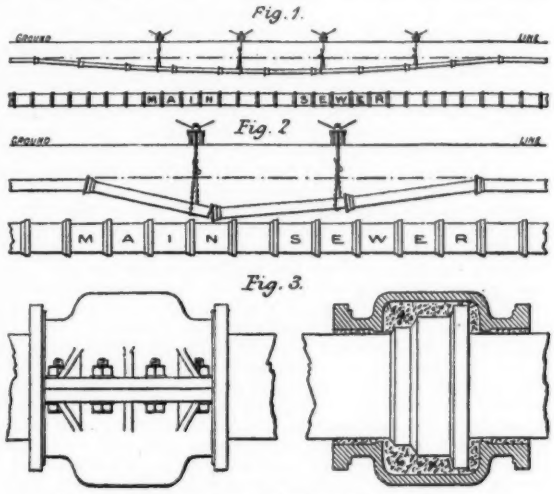


FIG. 1.—PLAN SHOWING A SUBSIDED GAS-MAIN.
" 2.—SUBSIDENCE AND FRACTURE OF A GAS-MAIN.
" 3.—SHOWS METHOD OF REPAIRING.

forcing the boards below the walling until they almost met. I do not think the main dropped then, because it was much nearer the surface than the sewer, and was held up by the timber, which was all right at the top. The pipes were put in as quickly as possible, you may be sure; but the timber was drawn too early—causing the ground to crack on each side and fall in as far as it could, in some instances only very little, in others a foot, and even more. We at once bared the main, when it was found to have subsided, as shown in fig. 1. Several of the joints were drawn. These were at once stopped temporarily, as we were suspicious of further subsidence. I then had to think of the best means I could to lift the main back to its proper position, as we were almost innocent of the same; and I could only turn out my men, some with bottle jacks, some with blocks, and others with that earliest mechanical power of all, the lever, giving passers-by the impression that the job had been let at random to a marine store dealer, to accomplish in any way he chose, and with anything that first fell to his hand out of his miscellaneous collection. I should mention that it occurred in the height of the Cleethorpes season, and that thousands of people passed daily along the road from all parts of the country. Having several spare retort handles and crossbars, I got four of the T-handles made into hooks and the crossbars into nuts, with two handles (see figs. 1 and 2). We then got some strong chain; and there being plenty of timber on the spot, we placed two planks across the trench (edgeways, as shown), with an iron clasp to prevent them parting, a washer under the nut well oiled, and posted a man at each screw—giving the two in the centre orders to slowly tighten their chain and the two outside to keep gently following as they felt their chain slackening. We took care to follow up the main with suitable backings in its upward movement; and fortunately we did, for two chains broke, and, but for that precaution, the last fall would have been worse than the first. After restoring the main to its original position, lead joints were made, and so completed.

Subsidence No. 1.—Another gang of men commenced a mile or so farther down the road, and thinking the ground was sound (it looked very good clay) never put in a strut at all, until the walls of the trench showed unmistakable signs of meeting, but luckily left our main in position. Subsidence and fracture No. 2.—On the 17th of August, another and more dangerous slip occurred. We lifted the main at once, and found it broken in two. We ran lead joints and temporarily repaired the broken part, and filled up for Sunday, it being close to a switch of the tramway, and interfered with the working of the cars. In truth, that was partly responsible for the mishap. As soon as possible, we got a muff (shown in fig. 3), and placed it in position, built up two clay collars and mouths to a sufficient height, and then poured into one pure Portland cement, rather thin at first and afterwards thicker, until the water and thin cement flowed out of the other mouth, the solid settling at once in the cavity, a hole having been previously drilled in the top of the muff to let out the air and also to watch the cement. After hardening a little, the clay collars were removed, and the faces trowelled up.

A perfectly sound joint was made; and there has not been the slightest escape of gas since, as far as I know.

*Discussion.*

The PRESIDENT (Mr. J. Barton), in inviting comments upon the paper, remarked that he was sorry Mr. Drewry was unable to be present, so that he could have replied to the discussion.

Mr. W. BARRATT (Grantham) said he was pleased the paper had been read. That Mr. Drewry had had the stamina in him to send the paper and the accompanying plans to the meeting, he took as an evidence that young men were bringing themselves out a little. He knew in some societies the young men felt they had been kept back; but in their Association (he believed he had intimated this once before) they wanted all the members to say something upon every paper that was read, and to give their fellow-members the benefit of their opinions. Many of them had ideas that were lying dormant; and these meetings gave them the opportunity of imparting them. With regard to the paper, much that was contained therein was not new, but part of it was. The ground in the locality mentioned in the paper was made up of sand and gravel; so that when the work was carried out, the main was sure to be let down. With regard to the means that Mr. Drewry adopted for lifting the mains, he must say there was nothing original in them.

Mr. H. WIMHURST said it was rather unusual for a gentleman to read a paper and then criticize it; but he was in that position. It seemed to him to be an unnecessary expense and trouble to get the special "muffs" (as Mr. Drewry called them) cast for the joint shown in the drawings. If he had had to deal with the matter, he should have cut a short piece out of the pipe, inserted a new piece, and used a double collar. However, with regard to the fracture which occurred on a Saturday, the author seemed to have adopted a ready method of temporarily repairing it for Sunday, and at a much less cost than he could have done it as a permanent job. He took it that these "muffs" would have to be specially cast. He had never seen them before himself; and if they had to be specially made, they would certainly cost more than ordinary 8-inch double collars.

Mr. W. J. BEST (St. Ives) said he did not think much could be said on the paper. It described a very simple arrangement for repairing pipes; but it was only what anyone else would do under similar circumstances. He thought that what Mr. Drewry called a "muff" was a "muff" (laughter); and, in his opinion, a double collar would have made a more permanent job. He should merely have cut out a short piece of pipe, and used a double collar.

Mr. BARRATT asked how Mr. Best would have kept his gas supply up if he had done so.

Mr. BEST said he had kept his gas supply up on similar occasions, when repairing mains. His day supply was not very great. He simply used bladders, and ran a 1½-inch wrought-iron pipe behind the broken main.

Mr. BARRATT: There the question of cost comes in.

Mr. F. WELLER said he had been placed in a similar position to that described by Mr. Drewry in Yarmouth, or rather on Cobholm Island, which was part of the borough. In the course of laying a new sewer, one of his gas-mains was broken in four places. A great leakage resulted; and he determined to strip the pipe. The soil in the locality was quite a bog; and at about a foot below the surface, it could be taken in the hand, and rubbed up into a silt. He was therefore in a very similar position to the author of the paper; but his (Mr. Weller's) main being broken in four places, he decided to re-lay it. As Mr. Wimhurst and Mr. Best had said, he did not think he should have gone to the expense of a special casting. He had had his largest main—a 7-inch one—broken in two different places through the action of the soil; but he bye-passed the gas, and put a short piece of new pipe in, with a double collar. In his district, a main laid in the north part, after fifteen years' service, had to be taken up, owing to the action of the salt soil on it. After ten or twelve years' use, these pipes could be cut with a knife; but by exposing them to the air they hardened, and could be laid in the other part of the district—continuing in use for more than twenty years.

Mr. E. J. BROCKWAY (Oakham) observed that he did not think the arrangement Mr. Drewry had shown them was a "muff" in the sense Mr. Best would have them believe it was. The idea, in his opinion, was a great improvement on the ordinary double collar, because in the time that was occupied in cutting out a piece of the main for the double collar, the muff could be bolted together. There must be a considerable saving of time; and, besides, the supply was kept up without going to the trouble of connecting a 1½-inch pipe each side of the broken part, and bye-passing the gas. Repairing a pipe under the ordinary plan would take at least two or three hours; while pouring in the cement, and coupling up the muff in the way shown would only take a few minutes.

Mr. WIMHURST: If you had the muff by you.

Mr. A. MITCHELL (Bury St. Edmunds) said that if he understood the drawing aright, there was not a piece broken out of the main; but the main broke right over in front of the socket. He was of opinion that Mr. Drewry took the best course under the circumstances. He pulled the main up to its proper level, set the two ends together, and temporarily made a casing of clay, which he filled up with Portland cement. It was not always a question of how little a repair would cost; but the chief point for consideration generally was how to effect a repair like the one described, and interfere as little as possible with the gas supply. Mr. Drewry adopted this unique plan of making a casing of clay and pouring in Portland cement, and then he had ample time to get the outside casing, or "muff," made. It was really only a pair of collars that had to be made with a wider portion in the centre, as it had to overlap the socket. The drawing reminded him of a main he once had in precisely the same position as was there shown; but fortunately in that case they had a main on both sides of the street, and so were able to repair the fractured one at leisure. Even taking expense into account, he considered Mr. Drewry had adopted the best course.

Mr. C. E. JONES (Chesterfield) said the paper before them, emanating from a young man, deserved great encouragement. He hoped (although it did young men good, and old ones too sometimes, to have their productions severely criticised) it would not be forgotten that the author had been put to a considerable amount of trouble in preparing his drawings, and giving the members his experience. One thing that struck him in listening to the paper was the increased responsibility upon gas managers by what might be termed the necessities of domestic civilization. What with the water-carriage system, sewers, the multiplicity of telephone poles, telegraph poles, electric lighting poles, electric lighting mains, and other things, it followed that the injury to gas-mains must become more frequent, and of a more considerable character than it had ever been in the past. He had been very much struck in some parts of the country with the utter absence of any regard to property underground which was manifested by some local surveyors and engineers of corporations and other bodies. They thought nothing of breaking gas and water mains. If it happened to be a water-main, and they were flooded out, then the company heard of it; but if it chanced to be a gas-main, they would get a piece of clay and put in the hole, fill the trench in, and go on. Then the company would not hear of it, until someone's house was nearly blown up; and then these local officials would come quickly enough and blow them up. (Laughter.) This showed that the responsibilities of gas managers were increasing day by day. Bearing in mind the geological formation of the subsoil, it would be a question for Mr. Drewry's consideration whether, in some of the worst places at Cleethorpes, it would not be worth his while to carry his mains on piles. In some cases, particularly in the mining districts with which he (Mr. Jones) was acquainted, they used wrought-iron largely; and even then they had considerable difficulty in keeping up a constant supply of gas, without fractured mains and consequent leakage. He thought there could be no doubt, as had been stated, that the action of saline salts upon cast iron had the effect of depriving it of its tenacity, so that it could be cut with a knife. He remembered some years ago at Portsmouth a number of piers going in a similar way. He did not suppose wrought iron would be especially applicable under such circumstances any more than cast. He should certainly recommend Mr. Drewry in the case mentioned, if he had any further difficulty, to pile the main, and see whether he could carry it in that way. He (Mr. Jones) was sure there was no desire on the part of the gentlemen who had criticized the paper adversely to say anything to deter any young member from preparing a paper and bringing it before the Association. Perhaps "muff" was an unfortunate word to use to describe a double collar, as it had so many constructions; and it would probably have been better if Mr. Drewry had said that he put a double collar over the socket.

Mr. E. D. SAPEY (Horsham) was invited by the President to speak; but he said he thought the subject had been quite exhausted. He could not see that there was anything new in the idea. If he had had to contend with the matter, he should have lifted the main in the same manner; but, as other speakers had remarked, perhaps a double collar would have been cheaper.

The PRESIDENT said he thought Mr. Drewry would be pleased when he read the good discussion which had taken place on the paper. He might say that, before he came to Peterborough, he had some little experience in piecing mains in this manner. That was in a country district. They had mains broken to the extent of from six to eight a day; and they had to resort to this mode of repairing them. It was simply compulsion with them. They had a long district; and five to six miles of mains behind them. It was found that piecing mains in this way was the cheapest; and, moreover, the supply of gas could then be maintained. An 8-inch main was getting on to rather a large size; and if a piece had to be cut out, a short length inserted, and a double collar put on, this caused delay. But if the pipe was raised, and a temporary stoppage made, suitable sized clips could be procured; and all that had to be done was to put them in position, and tighten them up. This made a first-class job, with very little trouble. He had much pleasure in proposing a vote of thanks to Mr. Drewry for preparing the paper and plans.

Mr. BEST seconded the motion, which was unanimously carried.

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Mr. DREWRY has sent the following reply to the various remarks made in the course of the discussion on his paper:—

I think it only fair to say that some of the early speakers do not appear to take in the situation. The 8-inch main supplies

a populous district, having several powerful gas engines and cookers at work; and nothing less than a 3-inch bye-pass could be thought of. Now to drill, tap, and insert a 3-inch pipe would require such apparatus as cannot be found on every gas-works, and would be no enviable job. Of course, if a necessity, it would be a different thing. I also wish to say, for the benefit of my critics, that I have had a lively experience, and of some length of time, with main laying in all its branches, and have found it a very difficult matter to repair a large main in a quiet out-of-the-way town, and in the only entrance to Great Grimsby on the east side, with merely about 4 feet space between the tram lines and the kerb in which to do the work and place the soil, the tram whistle constantly sounding for you to stand clear. I consider that I adopted the very best method, irrespective of cost, that I could possibly have done. Now for the much-abused "muff." Seeing what was required, I asked the Staveley Iron Company if they kept anything of the sort. They said they had a pattern of one for a 9-inch main if that would do, which, of course, it would; the only difference being that a little more cement would be needed. The cost, therefore of the muff and bolts was only slightly more than two collars and a piece of pipe, to say nothing of the trouble and time saved by not having to open extra holes for the bye-pass and bladders, &c. Besides, my plan has many important advantages, one of which is safety. As regards the name, the makers called it by that appellation; and I (simply enough, I admit) fell into the grave error of calling it what they did—a "muff," instead of a double collar. With these remarks and explanations, I consider the criticisms kind and generous, and thank the members for their courtesy.

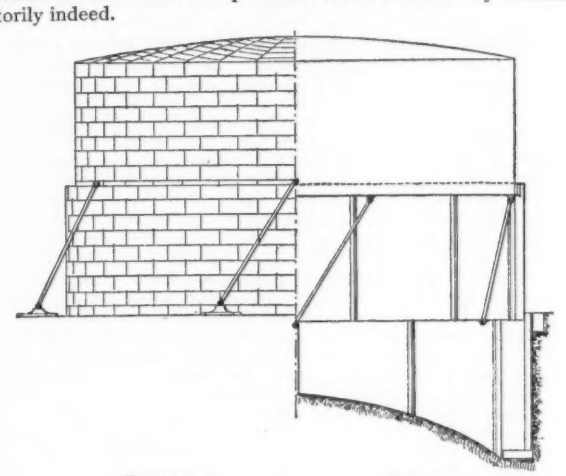
**Statistics of Gas Supply in Scotland.**—The report of the Committee of the North British Association of Gas Managers, furnishing statistics of the gas supply in Scotland for the past year, has been issued, under the supervision of the Secretary, Mr. R. S. Carlow, Engineer and Manager of the Arbroath Corporation Gas-Works. The statistics presented are scarcely so full as those contained in the report for the previous year; for while particulars are given with regard to a few places which did not before send returns, there are, on the other hand, a greater number of blanks than before. At the same time, the pamphlet contains a large amount of information, the compilation of which is highly creditable alike to the Committee and the Secretary.

**The Railway Rates Inquiry.**—The inquiry which has been for some time in progress, under Lord Balfour of Burleigh, on behalf of the Board of Trade, into the subject of the Railway Companies' charges for the carriage of merchandise under the Railway and Canal Traffic Act, 1888, was concluded a short time ago, as far as England is concerned; and the Commissioners then shifted their seat of operations to Edinburgh, where they were engaged for several days hearing the objections of interested parties in North Britain. The Commissioners completed their labours last Tuesday, when the President took the opportunity of giving those present some idea of the magnitude of the investigation he had been called upon to conduct. He stated that that was the 60th day of the inquiry. They had received the evidence of 31 witnesses for the Railway Companies, and of 126 on behalf of the traders. About 36,500 questions had been put to the witnesses, who had handed in 480 documents—many of them extending over a number of pages—and close upon 1000 tables. They had also before them minutes of no less than 1500 objections from 4000 different trading firms, Chambers of Commerce, and public bodies; and there would be hereafter the Commissioners' own scrutiny of the proposals that had been submitted to them. Taking all these things into account, he thought it would be matter of surprise if any material point had not been brought before them. The inquiry in Ireland will begin on the 17th inst.

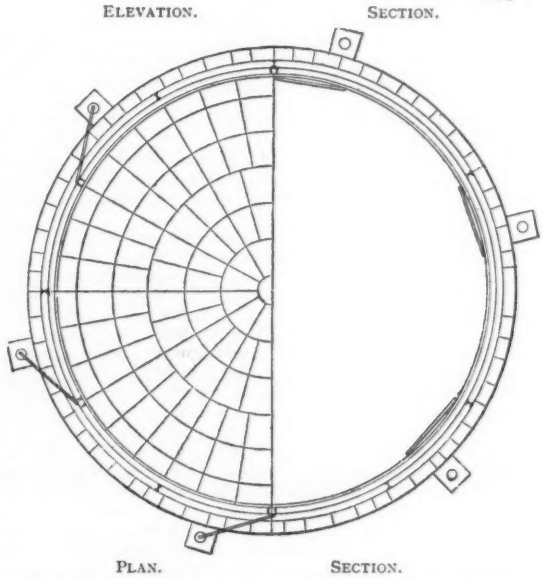
**The Wenham System of Lighting and Ventilating.**—In the first number of the JOURNAL for the current year we noticed the adoption of the Wenham system of regenerative ventilating lighting in the Nottingham Free Library, under the direction of Mr. W. R. Chester, the Gas Engineer to the Corporation. The Library forms one wing of the National History Museum, which has for some time been undergoing repair. The work, however, is now finished; and arrangements were made for the opening ceremony to take place yesterday morning. As the museum will be open in the evening, the question of lighting had to be considered; and the experience of the Wenham system in the reading-room, where it has worked very satisfactorily, led to its extension to the Museum. As in the installation in the other part of the building, any danger of heat from the lamps charring the beams of the ceiling is avoided by the construction of four shafts running the whole length of the room. They consist of galvanized iron tubing, packed in slag wool, enclosed in another shaft, and covered with slate slabs, over which are laid the boards of the floor above. The heat from the lamps will be carried into the open air by these tubes, which also form ducts for the removal of vitiated or partly vitiated air from the room. The lamps, in their casings of Doulton ware with brass mountings, have an ornamental appearance. This new lighting arrangement has been entirely carried out by the workmen of the Corporation, under Mr. Chester's supervision.

## TERRACE'S PARALLEL MOTION FOR GASHOLDER GUIDING.

In the JOURNAL for Jan. 8 of last year, an illustrated description was given of an arrangement devised by Mr. James B. Terrace, of Brechin, N.B., for guiding gasholders by means of sets of spur wheels keyed upon spindles long enough to reach the distance at which the guide columns are ordinarily placed round the tank of a gasholder. Mr. Terrace now sends to us for publication a drawing representing a double-lift gasholder, 60 feet diameter (the inner lift, 58 feet), each lift being 18 feet deep, the working movement of which is controlled by means of a number of long connecting-links situated at regular intervals round the tank, instead of the ordinary guide-framing. A model of the arrangement has, it is said, been made—2 feet in diameter, with each lift 8 inches deep—and is found to work very satisfactorily indeed.



ELEVATION. SECTION.



PLAN. SECTION.

One half of the drawing is in section, showing the inner-lift connecting-links *inside* the holder. One end of each link works into a bearing fixed on the bottom curb of the inner lift; the other end working into a bearing fixed on the bottom curb of the outer lift of the gasholder. These links, six in number, control the action of the inner lift only; and when the holder is being filled, one end of each link rises from the horizontal to an angle of 60°, and remains at this angle as long as the two lifts are cupped. The other part of the drawing is not in section, and shows the outer-lift connecting-links *outside* the holder. One end of these links works into bearings fixed on the bed plates anchored on the ground outside the stone coping of the tank. The other ends work into bearings fixed on the top curb of the outer lift. These links—also six in number—control the action of the outer lift; and when the holder is being filled, one end of the links rises from the horizontal to an angle of 60°, when it is filled to its utmost capacity.

In addition to the ordinary working of the gasholder, these links cause a rotary or side-way motion to take place. All the bearings to which the links are connected therefore require to be on the double-joint or ball-joint principle. With this side-way motion of the holder, the bottom curb guide-rollers could, however, be dispensed with, as the points of contact deviate in the circuitous path along the upright guides.

The controlling links may be placed otherwise than described

above; and in the case of a three-lift holder, two tiers could control the three lifts—one set being used for the inner lift only, and the other set for the second and outer lift. The links for the latter two lifts would be connected to bearings fixed on the top curb of the second lift; the other ends working into bearings fixed on bed plates or columns anchored on the ground outside the stone coping of the tank.

Mr. Terrace claims that, when these controlling-links are placed outside the holder, they not only keep it in proper equilibrium during its working movements, but act as strong supports. While some of them are in tension, the others are in compression; and so they relieve the bottom curb of the holder of a large amount of the strain which, in the case of some recent inventions, it is called upon to bear.

## THE AVERY GAS PROCESS.

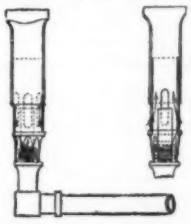
The Directors of the Avery Gas Company, Limited—an undertaking of which we have heard very little of late—have just issued to the shareholders, through the Secretary (Mr. C. Jenkins), an interim report, setting forth the economy of their system. In it they state that the recent experiments with the Avery furnace at Beckton have fully borne out the results of the installations formerly made by the Company at Cleckheaton and Elland, as well as in several towns in the United States. It has been found that the best oils to use are crude petroleum, or the residuum of this oil. The crude oil produces rather a stronger light; but leaves a residual in the retorts. This, however, is stated to be easily dealt with. The residuum, on the other hand, leaves no deposit, but is completely gasified. From one gallon of crude petroleum, at Beckton, 125 feet of 43-candle gas were obtained; but it is thought that if the furnace were worked continuously, a much greater quantity could be produced, because in cooling down the furnace much power and heat are necessarily lost, whereas when it is continually kept hot its power is greatly increased. The price now quoted in London for crude petroleum in bulk is from £3 to £3 5s. per ton. The latter figure has been quoted for a supply of 36,000 tons a year to the Avery Company. The same quantity of residuum has been assured to the Company from Zante at £2 per ton, *plus* the freight, which would be about 10s. per ton. Putting, however, the oil at £3 5s. per ton, and allowing 250 gallons to the ton, the result is 31,250 feet of 43-candle gas per ton, or more than twice the candle power produced from a ton of cannel coal, costing 42s. For producing gas as an enricher to ordinary coal gas, crude petroleum as against cannel coal would, the report states, be worth £8 8s. per ton. The experiments show that the gas can be diluted with air or hydrogen, and increased in volume almost in the same proportion. Putting ordinary coal gas at 16-candle power, and assuming that the Avery gas is diluted and expanded in volume proportionately, and reduced to the same candle power as coal gas, the result is 90,000 cubic feet of 16-candle gas from a ton of crude petroleum, which makes it cost only 7¾d. per 1000 cubic feet, as against 1s. 2¼d. per 1000 cubic feet, the cost of coal gas. (This 1s. 2¼d. is calculated on the basis of ordinary gas coal being only 11s. per ton; recent prices are 16s. per ton, and upwards, with a tendency to go higher.) The furnace at Beckton is the same size as the others—viz., about 5 feet broad, 6 feet long, and 8 feet high—and will produce 100,000 cubic feet a day. The gas when made goes into the main to which it is attached, and is burnt with the other coal gas. Just before it enters the main, it is tapped by a much smaller pipe which leads into a testing-house. The cost of the whole furnace, including setting up, was considerably under £200; and the report states that if 20 were erected they would in all probability not cost £100 each. These would make 2,000,000 cubic feet a day, and it is calculated would save The Gaslight and Coke Company no less than 7¾d. per 1000 feet, or £22,050 per annum. But they make about 20,000 million cubic feet per annum, or on the average, 55 millions per day. Were they to use Avery gas entirely instead of coal, therefore, they would, according to the Directors' calculations, save about £550,000 per annum. They do not, however, expect them, or any other company, to adopt it altogether; but the present increasing price of coal, the uncertainty of the supply caused by the strikes, and the competition of petroleum and electricity, now compel all gas companies, they think, to look out for another and independent source such as the one which they are advocating.

**Destruction of the Louisville (U.S.A.) Gas-Works.**—One of those terrible tornadoes with which America is occasionally visited, swept over the Ohio Valley last Thursday, bringing death and destruction in its train. Louisville, in Kentucky, appears to have borne the brunt of the storm, which struck the place about nine o'clock in the evening. The wind, which was from the south-west, completely wrecked some 200 or 300 houses, as well as the gas and electric lighting plants. Added to the other disasters, the town was plunged in darkness, which was broken only by the flames from burning buildings. Beyond the destruction of the lighting plant, it is believed that the water-works have been reduced to something approaching ruin. Unfortunately, the loss of life has been very great.

# REGISTER OF PATENTS.

**Gas-Heating Appliance.**—Tasker, W. H., and Whitehead, W., of Scarborough. No. 2990; Feb. 20, 1889. [8d.]

This invention consists of means for making use for heating purposes of ordinary gas-pendants or fittings without removing the lighting burners, or in any way interfering with the fittings.



Figs. 1 and 2 are elevations (at right angles to one another) showing the heating burner applied to an ordinary gas-bracket.

To carry out the invention, a tube is employed sufficiently large to pass easily over the ordinary lighting burner; such tube having at its lower extremity V (or other shaped) pieces cut out in such a manner as to form points, forks, or claws with air passages between. The tube is also of such thickness as to admit of the points being bent inwards in order to grip on to the part of an ordinary gas pendant or fitting where the gallery is usually fixed which supports the globe, and inside of which the burner for lighting is placed. In the tube above the points, there are formed elongated perforations or holes of suitable width, and in length about one-third the entire length of the tube. These perforations are for the purpose of admitting air into the tube. Between the points and the holes, a shoulder or projecting ring is formed round the tube, the use of which is to stop the downward movement of an outside tube or sleeve arranged to slide friction-tight on the tube, so as to open or close the elongated perforations as may be needed for perfect combustion. The outer tube or sleeve may at its upper end be left completely open, or it is preferably cut with V (or other shaped) pieces in order to enable a rose shape of flame to be formed by bending the points inwards towards the centre of the tube, so as to form a slot or mouth. As the outer tube or sleeve is moved upwards, it lengthens the tubes in telescope fashion, and thus carries the combustion flame farther away from the gas supply—preventing the striking back of the flame down the tube.

**Gas-Governors.**—Sturgeon, Thomas, of Ilkley. No. 6134; April 10, 1889. [8d.]

The specification of this invention describes (1) a gas-regulator consisting of an inverted cup in combination with arrangements for shutting off the gas before the pressure rises too high; and (2) a gas-regulator consisting of two inverted cups on a scale-beam, so arranged that, before the pressure reaches too high, one of the cups will rise and cause the other to fall, and so shut off the gas by means of a liquid valve.

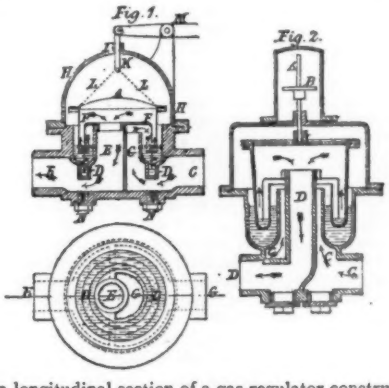



Fig. 1. is a longitudinal section of a gas-regulator constructed in the first-named manner, together with a plan of the lower part of the apparatus containing the gas passages and the fixed trough. A is a dome-shaped cup; B, an annular trough; and C, a thin annular projection dipping into a fixed trough D. The exit pipe or passage is shown at E; F being the plate and projecting rim. The inlet passage is shown at G. When the pressure of the gas in the inverted cup becomes too great, the cup rises, and the lower edge of the projecting rim F becomes immersed in the liquid in the annular trough B. Any further supply of gas is thereby cut off until some of that which is in the inverted cup is used. The cup then again falls owing to the pressure being reduced, when the supply is again renewed. H is the cover which carries the guide I for the rod K. From this rod the inverted cup is suspended by cords L. The other end of the rod is connected to the lever M carried by the cover H; and to the free end of this lever weights may be attached, so that the pressure at which the apparatus shuts off the gas may be regulated to a nicety. By taking out the plugs N, any water which may settle in the apparatus may be run off. This apparatus is intended for domestic use, to be fixed on the gas-pipe as near as convenient to the meter, and between it and the first burner. In apparatus of this size the liquid used would be mercury.

Fig. 2 shows a slightly modified arrangement of this apparatus. Here the thin annular projection C, in fig. 1 is dispensed with; the annular trough round the rim of the inverted cup being deepened so as to project further down into the mercury in the fixed trough. The weight of the mercury in the fixed trough will thus, to a certain

extent, balance the weight of the inverted cup. The spindle A projects through the cover, and is provided with a plate B, so that, if necessary, the inverted cup may have extra weights added to it. In this arrangement the inlet passage C surrounds the outlet passage D. The inverted cup is here shown in the position it occupies when cutting off the gas—that is, when it is up as far as it will go.

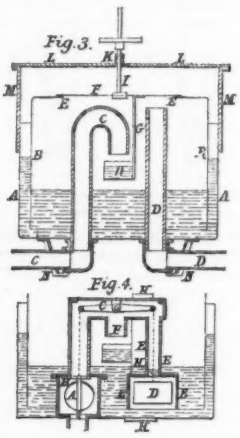
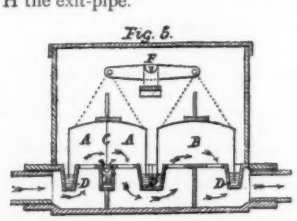



Fig. 3 is a section of another arrangement, modified in form and details. A is a cylindrical iron or tin tank containing water or glycerine. B is the inverted cup; C the inlet-pipe; and D, the exit-pipe. The inlet-pipe is bent round so that its orifice will point downwards. A wide opening is left in the cup at E; this opening being closed by the lid F, to the underside of which is attached the rod G carrying the cup H, which is about half filled with mercury. The object of the wide opening E is that, after the inverted cup has been placed in the right position in the tank, the cup containing the mercury may then be lowered carefully at one side of the inlet-pipe. When the mercury cup is lower than the orifice of the inlet-pipe, the lid is shifted sideways, so as to bring the cup of mercury exactly under the inlet orifice, and as nearly as possible concentric with it. The lid F also carries the rod or spindle I, which works through the guide K, carried on the light cross-bar L, and fixed at the ends to the two light uprights M, attached to the sides of the tank. The cross-bar L is fixed in its place after the lid has been properly adjusted and fixed. N are feet attached to the bottom of the tank. The free end of the spindle may be connected to a weighted lever, or weights may be applied direct to the spindle as circumstances require. When the inverted cup rises in consequence of the pressure of the gas, it carries with it the cup of mercury; and the orifice of the inlet-pipe becoming immersed in the mercury, the supply of gas is shut off, and the orifice will thus remain closed until some gas is drawn off from the apparatus and the inverted cap falls, carrying with it the cup of mercury, and so opening the inlet orifice and allowing a fresh supply of gas to enter the apparatus. This is the form of apparatus preferred for use with gas-engines or in other cases where the consumption of gas is large.

Fig. 4 shows a section of apparatus to be used in connection with this form of gas-governor; the object being to shut off the supply of gas altogether in the event of the level of the liquid becoming so low, through evaporation or other cause, as to endanger an escape of gas. A is a ball-valve in an enlarged part of the inlet-pipe B. This valve is attached to one end of a lever C. To the other end of the lever is connected the float D; the casing E being carried sufficiently far down to prevent the gas escaping up the sides. When the level of the liquid gets below a safe point, the float D will sink, and thus draw up the ball-valve A against its seat, thus shutting off any further supply of gas. The stoppage of the gas will notify that the tank requires replenishing with liquid. F is the orifice of the inlet-pipe; G the cup of mercury; and H the exit-pipe.




In another arrangement of the invention, two inverted cups are used, one attached to each end of a scale-beam. Cup No. 1 is furnished with a partition or midfeather, dividing it into two portions; but the bottom edge of the partition does not come so far down as the bottom edge of the cup. The bottom edges of the cups dip into troughs containing mercury, or other liquid capable of making a gas-proof joint; and a trough is also provided into which at times the edge of the partition will dip. The gas is admitted at one side of the partition; and the cup lifting allows it to pass under the edge of the midfeather to the other side, whence it can freely flow into cup No. 2, which is always open to the exit-pipe. In case of the gas not being used to its full extent, the pressure in this cup will rise, and the cup itself lift in consequence. Cup No. 1 will be thereby lowered, and thus dip the edge of the partition into the liquid, and make a joint so as to shut off the gas until the pressure again falls, and the cups resume their former position. Weights may be added to one or other of the cups, or be applied to a lever on the fulcrum of the scale-beam, for the purpose of adjusting the working pressure of the apparatus.

Such an apparatus is shown in fig. 5. Cup No. 1 is shown at A, and cup No. 2, at B; the former being divided by the partition E. The troughs containing the liquid are shown at D; and the scale-beam at F—one of the inverted cups being suspended at each end by cords. When the pressure in the cup B rises too high, this cup lifts, and cup A falls; thus bringing the bottom edge of the midfeather C sufficiently down into the liquid to cut off the further supply of gas. It may be that cup A will now tilt a little, owing to the pressure on the supply side being greater than that on the other side; but if the edges dip sufficiently into the liquid to begin with, this will not affect the result.

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**Gas Burners and Lamps.**—Manoschek, F. & R., of Vienna. No. 5288; March 27, 1889. [8d.]

According to the present invention in regenerative burners or lamps, they are provided with one or more chambers forming an air reservoir into which the outer air passes on its way to the flame, and in which it is heated by the products of combustion before passing against both sides of the flame. For this purpose there is formed above the burner a chamber or chambers of comparatively large capacity, from which pass firstly branch tubes in an upward sloping direction, connected at their outer ends to a casing surrounding the chamber so that the outer air enters the branch tubes from the exterior surface of the casing; and, secondly, the chamber has other branch tubes sloping in a downward direction, and having their ends also connected to the casing, so that the air that had previously entered the casing through the upper branches and become heated therein, issues through the lower branches to the flame of the burner.

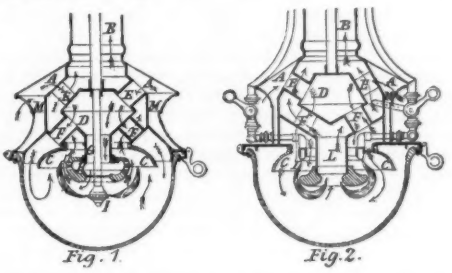


Fig. 1 shows a vertical section of a lamp with an outward burning flame supplied from above. Fig. 2 shows a vertical section of a lamp with an inward burning flame.

Under the outer hood of the lamp, openings A are formed in the casing M, through which the outer air is admitted; the openings being connected by tubes or passages E to the air chamber D, into which consequently the outer air passes. From this chamber the air flows through other tubes F and over the reflector C to the outside of the flame, and through a central tube G to the inside of the flame. In the arrangement shown in fig. 2, the air passes in the same manner as in fig. 1; but the air supply issuing from D through the tubes F passes both to the inner and outer surfaces of the flame—there being no central supply-tube. The hot combustion gases passing away from the flame come intimately in contact with the outer surfaces of the air chamber D, and of the tubes E F G; and thus impart heat to the air supply passing through them, before escaping through the chimney B. In the arrangement shown in fig. 1, the air tube G is provided with a head H, which directs the air against the flame; while in fig. 2 the tube L, through which the combustion gases escape, is also provided with a head H, for giving the necessary form to the inward burning flame. The burner I may either be of rosette shape, as in fig. 1, or of annular shape as in fig. 2.

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## APPLICATIONS FOR LETTERS PATENT.

4164.—ABEL, C. D., "Improvements in the means and apparatus for governing gas and petroleum engines." A communication from the Gas Motoren Fabrik Deutz. March 17.

4197.—MÜLLER, H. L., and ADKINS, W., "Improvements in apparatus for the production of lighting gas." March 18.

4208.—THOMASON, J., "An automatic gas-valve." March 18.

4217.—VESTRANT, L. VAN, "Improvements in apparatus for charging inclined gas-retorts." March 18.

4223.—LANGER, J. VON, and COOPER, L., "Improvements relating to the production of water gas and generator gas, and to apparatus connected therewith." March 18.

4224.—LANGER, J. VON, and COOPER, L., "Improvements in apparatus for the generation and enrichment of water gas and producer gas." March 18.

4225.—LANGER, J. VON, and COOPER, L., "Improvements in or connected with valves for hot gases." March 18.

4289.—CULLEN, J. B., "Improved safety gas-bracket or pendant." March 19.

4314.—SCHREINER, J., and SALZ, B., "An improved device for automatically igniting and extinguishing lamps, or raising and lowering the flames of gas-burners." March 19.

4324.—KELMAN, J. A., "Improvements in apparatus connected with the manufacture of gas." March 19.

4355.—HANCOCK, D., and CRAIG, J. B., "Improvements in carbonated air gas produced from mineral oils or spirits." March 20.

4358.—ROBINSON, W. G., "Improvements in the construction of gas-generating burners for burning heavy hydrocarbon oils under pressure." March 20.

4362.—BINNS, J. P., "Improvements in gas motor engines." March 20.

4393.—LACOSTE, J., "Improved liquid-meter." March 20.

4415.—MATHER, W., "An improved cock for steam, water, gas, and all purposes where a cock or valve is used." March 21.

4523.—ABEL, C. D., "Improvements in gas and oil motor engines." A communication from the Gas Motoren Fabrik Deutz. March 22.

# CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

### The Proposal to Abolish Gasholder Guide-Framing.

SIR,—I hope I am properly impressed with the severity of your editorial remarks, following the publication of my letter; but I regret that your words do not in the least modify the "impression" I therein expressed. Indeed, they only intensify the same, and satisfy me that I was perfectly correct in my observations.

I have read the article as well as the paper you allude to; and as one is so much a reproduction of the other, I practically meant the two in my former letter's reference. I find nothing whatever, in either one or the other to suggest, by the remotest possibility—in spite of the italicized ambiguous expression "guiding from the base"—the idea of guiding a holder from the bottom curb alone. Mr. Webber's proposal was fully and clearly explained both in the *article* and the *paper*, and was unmistakeably the idea of the "stumpy post in the socket," necessitating more or less guide-framing; and there can be no doubt that Mr. Webber was as surprised as were all the gas engineers of the country, when Mr. Gadd announced his proposition to guide a holder from the bottom curb *alone*. If Mr. Webber ever thought of proposing more than this stumpy-post-and-socket idea, how was it he never alluded to it in the subsequent controversy, when his proposal was so drastically handled by his critics?

You appear to challenge Mr. Gadd to speak; and it is to be hoped he will do so. But whether he does or not, I assure you that there are more than one—and gas engineers too—who think the *amende honorable* is very distinctly due to him, and that, for some reason, you have been very reluctant and slow to give

*March* 28, 1890. "HONOUR WHERE HONOUR IS DUE."

[It was only to show our desire to be fair to all parties, that we allowed our anonymous correspondent to have his say in this matter, although it is quite against our rule to admit personal reflections from writers who are not willing for their own identity to be as unmistakeable as that of the subjects of their remarks. This kind of partizanship may do more harm than good to its object; and even the writer must see that honour or censure so bestowed is at best equally worthless.—ED. J. G. L.]

### The Influence of an Idea.

SIR,—I have read with much interest the article appearing in your issue of the 18th inst., entitled "The Influence of an Idea," and cordially agree with much that is said therein, as probably all those do who have had much concern with works of construction during the last few years, and have observed the wonderful developments of new ideas and new methods. Certainly in these days new ideas should, and I think do, for the most part receive respectful attention.

There is one observation, however, to which I at any rate must take emphatic objection. You say: "Contractors who do not possess workable patents of this class will naturally disparage their value, in order to keep work in their own hands." Now, Sir, I hope that we gasholder makers are rather more enlightened than to merit such an aspersion.

With respect to the idea of gasholders without guide-framing, I am very willing to be taught, and should be glad of an opportunity of seeing the holders which have been erected on these new methods, and also of hearing more about them; how they work when under the real stress of a storm, and as to the real economies they promise.

So far I cannot associate these ideas with those that I have always understood from the users of gasholders as being their ideal of a perfect gasholder: A vessel free to rise and fall vertically, free from all avoidable friction, and preserving a constant pressure on the gas contained therein. To insure this result, it has seemed to me that a perfectly unyielding guide-frame is desirable; and, as may be seen from your advertising pages, I have given some attention in this direction, and I believe not unsuccessfully.

*Westminster, March* 28, 1890. SAM. CUTLER.

### Suggested Adoption of the Discharge Note System for Gas Stokers.

SIR,—It has been demonstrated during recent months that there are to be found in nearly every gas-works "ready-made" agitators—men who are prepared to act on any advice to defy authority, and who prevent the better disposed workpeople from peaceably performing their duties. Many of these men will be discharged this spring, not to be taken on again in the same works. Such men migrate, only to imperil the supply of gas in other districts; but if all managers would require a discharge-note before engaging *strangers*, these men would have to find a more suitable sphere of labour than a retort-house.

By opening your pages to an expression of opinion as to the feasibility of this suggestion, you would assist lovers of

*March* 29, 1890. FAIR PLAY.

The Secretary of a Water Company wishes to know what reduction of water-rates (if any) consumers can claim when their dwelling-houses are temporarily closed, for at least three months, for the purpose of residing elsewhere, and written notice is sent to the Company to that effect, with a request to have the stop-cock shut down.

**The Bolton Corporation and the Electric Light.**—The Gas Committee of the Bolton Corporation have recently issued about 1700 circulars setting forth the probability of the introduction of the electric light, and asking the persons addressed if they were likely to become consumers. Only about 50 favourable replies have been received; and it is understood that the Committee will report against the immediate adoption of the Electric Lighting Act, on the ground that there is not sufficient public demand for the light.

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

During the past week the following progress was made:—

Bill read the first time: Clayton, Allerton, and Thornton Gas Bill; Hartlepool Gas and Water Bill; Luton Gas Bill.

Bills reported: Falmouth Gas Bill; Ystrad Gas and Water Bill.

Bills read the third time, and passed: Leicester Corporation Water Bill; Morley Corporation Water Bill.

## HOUSE OF COMMONS.

### Thursday, March 27.

STRIKES OF GAS STOKERS AND WORKMEN.

Mr. HOWORTH asked the First Lord of the Treasury whether, in view of the widespread danger and disaster which must inevitably ensue if a large town were suddenly put in darkness by a strike among gas stokers and other workmen associated with them in the production of gas, the Government proposed to introduce any legislation during the present session to put this class of artizans in the same category as sailors and postmen, and to limit or regulate their power of indiscriminate striking.

Mr. W. H. SMITH: The Government quite recognize the gravity of the subject to which my honourable friend alludes; but, having regard to the ability with which the Companies and authorities who are responsible for the supply of gas met the difficulties which were occasioned by the strikes without the assistance of any extraordinary powers, Her Majesty's Government do not think it is necessary for them to propose legislation which would interfere between employers and employed. They rely rather on the moderation and good sense of the parties to controversies of this character, and to the powerful influence of public opinion upon them.

During the past week the following progress was made:—

Bills read the first time: Leicester Corporation Water Bill; Morley Corporation Water Bill.

Bills reported: Higham and Hundred of Hoo Water Bill; Derby Corporation Bill; Derby Gas Bill; Thames Valley Drainage Bill; Pontypool Gas and Water Bill; Wallasey Local Board Bill.

Bills read the third time, and passed: Hartlepool Gas and Water Bill; Luton Gas Bill.

Petitions in favour of the Huddersfield Water Bill were presented from the Local Boards of Linthwaite, Marsden, and Slaithwaite; and the petition presented by the Northfleet and Greenhithe Gas Company against the Gravesend and Milton Gas Bill was withdrawn.

## HOUSE OF COMMONS COMMITTEE.

### Tuesday, March 18.

(*Before Mr.* C. ACLAND, *Chairman; Colonel* DAWNAY, *Captain* PENTON, *Mr.* M'INNES, *and Mr.* BONHAM CARTER, *Referee.*)

CANTERBURY GAS AND WATER BILL.

This Bill—the object of which is to authorize the Canterbury Gas and Water Company to extend their limits for the supply of gas, acquire land and construct new works, raise additional capital (£62,500 gas, and £31,250 water), apply for electric lighting powers, &c.—came to-day before a Select Committee, constituted as above.

Mr. LITTLER, Q.C., Mr. PEMBROKE STEPHENS, Q.C., and Mr. WORSLEY-TAYLOR appeared for the promoters; Mr. SAUNDERS, Q.C., and Mr. BAGGALLAY for the Corporation of Canterbury, who had been negotiating for the purchase of the Company's undertaking.

Mr. LITTLER, in opening the case, said the promoters were applying for further powers, and they asked to be allowed to acquire more land for the erection of gas-works, and also to increase their capital. Having given a short history of the Company, from the commencement of the undertaking in 1822, he said that in 1866 they obtained an Act to increase their capital and extend their powers. By this Act their dividend was limited to 8 per cent. Some difficulty had since that time cropped up as to the division of the capital amongst the shareholders of the Gas Company, and the proportion it ought to bear to the water part of the undertaking. Under their Act of 1866, the Company purchased three acres of ground for the construction of gas-works. By the present Bill they asked for power to acquire a piece of land, four acres in extent, close to the Chatham and Dover Railway Station, where it was convenient for receiving coal and tipping it direct on to the site of the works. They hoped these new works would satisfy their requirements for probably 12 or 14 years, which was the time generally given to a gas company applying for fresh powers. The capital of the Company had now been exhausted; and there had been an over-expenditure of between £5000 and £6000. On their new capital they asked for 8 per cent. dividend, in the ordinary way, for the water portion; and with regard to the gas portion, they proposed to make it also 8 per cent., but to apply the sliding scale to it, as was now done in respect of new capital, with 3s. 6d. per 1000 cubic feet as the maximum. They were now charging 2s. 10d. per 1000 feet. They further proposed to raise the minimum illuminating power from 14 to 15 candles; and this increase would cost them from 1¼d. to 2d. per 1000 cubic feet. Of course, they had to meet the new demands of their stokers; and it had been found that the loss to gas companies by the increased price of labour was quite 33 per cent.—the reduction of the working shift from twelve to eight hours helping to make up the difference. Then, again, coal was rising in value. The Company asked for power to supply electricity; and the only question was whether they should be entrusted with it in a place like Canterbury. The supply of electricity could hardly be successfully carried on unless upon an economical scale; and it could be better done by a gas company than by an electric lighting company. The only petition against the Bill was that of the Canterbury Corporation, who did not object to the quality of either the gas or the water, or complain about any mismanagement of the Company's affairs; and he should prove by

engineering evidence that there was not any complaint to be made. The Corporation objected that the new capital to be raised as ordinary capital should receive a dividend at the rate of 8 per cent.; and they submitted that it should be lower. Well, the auction clauses entirely removed that objection. Then they said that the proposed separation of the gas and water accounts, and the apportionment between those accounts of the expenses common to both, would be insufficient for the protection of the two classes of consumers. They seemed to think that the Company might, by throwing an undue proportion of the expenses on the water undertaking, so reduce the price charged to the consumers for gas as to receive, by the operation of the sliding scale, a higher dividend on the gas undertaking. It was perfectly absurd to suggest that anything would be done to keep up the price of water at the expense of the gas, or *vice versâ*; for the simple reason that, in the case of the new capital, anybody who happened to hold water stock would take good care that no such thing happened. This was a pure question of clauses. After objecting to the sliding scale, owing to the standard being too high, the Corporation asked that provisions should be inserted in the Bill empowering the Corporation to purchase the Company's property. This was the first instance on record of a Corporation asking for the insertion of a clause in a Bill to buy up a gas and water undertaking without charging them with all sorts of enormities; and certainly, in this case, it deserved some consideration, for from 1822 to 1874 the Company had not received any dividend.

The following witnesses were then called:—

Mr. *G. Furley*, who has been Chairman of the Company since 1865, said the present price of gas was 2s. 10d. per 1000 feet. The Company might have paid back dividends to the extent of £5000; but they had kept faithfully to their 8 per cent. Between 1877 and 1888 they had saved the consumers about £43,000 by making gradual reductions in the price of gas. The sale of gas had increased enormously. In 1877 it was 61,546,000 cubic feet; while in 1888 it was 984,037,000 cubic feet. They now asked for £50,000 additional capital for gas, and £25,000 for water purposes.

In cross-examination, witness said the existing capital of the Company was £35,000 for gas, and £57,500 for water; and their present proposal was to add £93,750 of capital, including borrowing powers. With the unexhausted borrowing powers of £12,500, the total would be £106,250. He admitted that the sliding scale, with the proposed standards, would enable the Company to declare a dividend of 10 instead of 8 per cent.; as, at the present price, they would be able to raise the gas dividend at once to 10 per cent. Questioned as to whether, under the sliding scale, the Company would be able to carry on their works more economically than at present, he said that the sliding scale would act both ways. If coal and labour became very dear, they would have to raise the price of gas, and then have reduced dividends; but if they were enabled to reduce the price by their economies, the Company would have the benefit of the rise of dividend. With regard to the question of electric lighting, the Company only proposed that they should be authorized to spend their money in going to the Board of Trade for a Provisional Order if they thought necessary. If they obtained the Order, they would be entitled to use their capital for the purpose; but they had no intention of doing so at the present time. Certainly it was not their object to prevent the introduction of electric lighting in Canterbury in competition with gas; for he did not believe it would succeed there. If the Company had electric lighting powers, they would not be inclined to act upon them unless very cheap motive power could be found.

Mr. *J. Burch*, Secretary of the Company, was next examined as to the financial history of the undertaking.

Mr. *T. Buckley*, the Water Engineer, said he had been in charge of the works for 14 years. He considered that the storeage should be increased, because if anything were to occur to one of the pumping-engines, the reservoir would be emptied in a very short time. They would require pumping-engines with hard-water pumps, one set of soft-water pumps, and a boiler of 50-horse power. They wanted a new bore-hole; and this would give a sufficient supply of water for the city. With these advantages they hoped to be able to keep a good supply of water in the reservoir at all times. The quantity per head sent out last year was about 20 gallons. In 1889 the bulk of water pumped was 146,773,000 gallons. The quantity they could pump at the present time was about 528,000 gallons in twelve hours. They had storeage for 363,000 gallons only. The requirements of the population were really 30 gallons per head; but they only had about 20 gallons per head. There was no fear of the supply of water coming to an end, for they had never found any variation in the wells.

### Wednesday, March 19.

Mr. *R. Hassard*, C.E., in reply to Mr. Worsley-Taylor, said he had carefully examined the water-works and mains, and had no doubt that they were very efficient, having regard to the date at which they were constructed; but he did not consider they were adequate for the present needs of the district, or for the prospective requirements within a reasonable number of years. Further engine power was wanted; and there should be an extension of the works at the pumping-station. He recommended an additional 70-horse power engine. He estimated that the buildings required could not be erected for less than £7500; and for the bore-hole of the well, he had put down £1500—making a total of £9000. An additional reservoir should be provided so as to give them a total storeage of about two days' supply. The works for distribution were capable of improvement. At present there was a 12-inch main laid from the pumping-station to the tank; and he suggested that another main should be put down. He considered that the street piping was laid out on rather an old-fashioned system. The service ought to be altered so that each street, or sections of it, could be supplied separately, in order that the streets should be independent of one another; and then, in case of an accident, it would not be necessary to cut off the supply to an entire district. The total cost of the improvements he suggested would be about £16,500.

Cross-examined by Mr. Saunders: He went over the works on the previous Saturday, up to which time Mr. Buckley was strictly responsible for the proposals put before the Committee. Confining himself to water only, he thought £25,000 would satisfy the needs of the town.

Re-examined by Mr. Worsley-Taylor: He had been dealing with the population inside the district supplied by the existing mains, and not with the legal limits of supply, which included a population of 15,000 extra.

Mr. Saunders asked the promoters to consider whether they could bind themselves to carry out Mr. Hassard's suggestion of separating the street service.

Mr. *Burch*, recalled, stated in reply to the Referee, that last year the Company made 108 million cubic feet of gas, and sold 98 millions; so that practically 10 per cent. represented the necessary consumption at the works and the leakage. They made about 9400 cubic feet, and sold about 8500 cubic feet per ton of coal.

Mr. *H. E. Jones*, M. Inst. C.E., examined by Mr. Worsley-Taylor, said he had been Consulting Engineer to the Company for ten or twelve years. The quality of gas they had supplied had been very good, and compared fairly with that of other companies in that part of the kingdom. The present price was 2s. 10d. per 1000 cubic feet; and the illuminating power fixed by the Company's Act of 1866 was 14 candles. They had not, however, kept vigorously to this, but had been making gas of slightly over 15-candle power. The administration had also been very economical; and it was scarcely possible to find a gas company in the kingdom with a smaller capital compared with the sale of gas, it having only £440 per million feet of gas sold annually. They worked up their residuals most carefully, and disposed of them to the best advantage. The maximum dividend of 8 per cent. was very reasonable; all the more so because it was charged on a moderate amount of capital. The consequence had been that they had been selling gas a great deal cheaper than other companies in the neighbourhood. This, together with the excellent management, had enabled the Company to sell gas of good illuminating power at a low rate. They had spent more than their original capital, and were now going on without any working capital at all. They had no further capital powers. They ought to have £75,000 at least as loose working capital. The works at present had abundant storeage plant and purifying power; but the retort-house was already worked up to the hilt, and could not be extended in the present site without pulling down the dwelling-houses and levelling up the ground, which was of very irregular shape. This would cost a great deal to do. In these days it was essential that there should be adequate storeage for coal. Formerly it had been held that a month or five weeks' storeage was sufficient; but the experience of the last two winters had shown them that they must have a great deal more than this. Nearly £2000 would be wanted to extend the retorts and the coal-storeage ground; and £1500 to improve the engine and boilers. But he would call that a mere hand-to-mouth extension. The Company had about 18 miles of mains, which were maintained in first-rate condition. The arterial main for the new district would have to be enlarged, and have about £500 spent upon it. This would have to be done probably very shortly. If the proposed extension of the borough were granted, this would add considerably to the demands upon the Company; and probably a good deal of expenditure on mains would be required in consequence. It was in the interests of everybody that the Company should go to this new site outside the town; and if they had powers to do so, they would not spend another shilling on the old site, because of the great economy which would then be possible in having the coals delivered direct from the railway on to the works siding. To the £11,500, the total of the figures he had already given, £2850 would have to be added for the new land and approaches. The annual rate of increase in the manufacture had varied from 3 to 5 per cent.; but it would not be at all safe to anticipate any less increase than 5 per cent. If the Company spent their capital in the future as moderately as they had done in the past, he estimated that they ought to have about £400 per million cubic feet of gas, and that the present sale would be doubled in about 14 or 15 years. They would therefore want £40,000 more capital. Altogether, including £2000 for connecting the new site with the old gas-works, the mains in the added area, and the 10 per cent. for ordinary contingencies, he computed that they would want a total amount of £62,035. With regard to the sliding scale and the proposed initial price of 3s. 6d., he considered that this was not at all too high. The present price was 2s. 10d. per 1000 cubic feet. The total expenditure on the 98 millions sold last year was less than £10,000, and worked out to nearly 2s. 1d. per 1000 feet. The dividend came to about 9d. per 1000 feet; making up the present charge of 2s. 10d., and supporting the impression that the gas-works barely earned the dividend on the capital. The Bill proposed to increase the illuminating power by one candle. Now the Company would have to keep a margin of illuminating power over the nominal power. In London they were obliged to make gas at least three-quarters of a candle above the standard. He therefore put down 1¼d. per 1000 feet as the cost of the extra candle power. Gas of 15-candle power was about the maximum that could be obtained with the best gas coal. To get beyond this they would have to resort to cannel, which was of less value, having regard to the residuals, &c., than ordinary coal. Then, again, they must bear in mind that the price of coal was rising. He considered that the net difference to the Company on the coal would be 3s. per ton. If they sold (say) 8800 cubic feet of gas per ton of coal, this would make a difference of 4½d. per 1000 feet. In regard to labour, there had been a movement all over the kingdom for shortening the hours of work. He considered that this was very little less than a national disaster, although it at first only struck the gas industry. The hours of labour had been cut down, and the gas companies were paying the same wages now for practically 30 per cent. less work. He therefore added 1¾d. per 1000 feet for labour. For interest on the additional £11,500 he added 1¾d. He considered that the £40,000 would earn its own interest. These figures would add nearly 8¾d. to the 2s. 10d., thus bringing it up to 3s. 6d., the standard fixed in the Bill. The improvement arising from the new site he hoped would enable them to work at a lower rate; and when that happened the public, under the sliding scale, would have the benefit of that. He was in favour of the sliding scale; and had never seen any instance in which it had not produced a reduction in the selling price of gas.

Mr. Worsley-Taylor: It is suggested that if we obtained the sliding scale with this initial price of 3s. 6d., it would immediately enable us to pay 2 per cent. more dividend?

*Witness:* I think it is an absurdity. The mere putting of the power in the Act of Parliament does not earn it; and we have got to earn it before we pay it.

In further examination, witness dealt with the water portion of the undertaking. He said he considered that the water-works were as good as could be found anywhere in the kingdom. The softening process adopted (Dr. Clark's) was the best known; and there was an abundant supply of water, provided they had the means of pumping. There were 18¾ miles of mains; and they supplied about 250 million gallons of water a year. The capital spent was £57,000, which was about £400 per million gallons—a figure which compared very favourably with other water companies. He agreed with Mr. Hassard that an engine would be required, and that the storeage might be increased. He had read the petition of the Corporation, and would like to say, in regard to it, that if anybody had to supply electricity to the city, no doubt the Gas Company could do it better than strangers. This he knew was the view of electricians, because they had over and over again approached him, in his connection with one of the London Gas Companies, to see if he could not adopt some method of working with them. If electric lighting was to be started, the Gas Company could do it more advantageously for the district than anybody else, owing to the great economy arising from the same staff looking after it and the gas and water.

Cross-examined by Mr. SAUNDERS: The Company would not apply to the Board of Trade for powers for electric lighting unless there was evidence of success.

Mr. SAUNDERS: Are you aware of any electric light companies which have paid dividends?

*Witness:* No; I am happy to say I am not.

Why are you happy?—Because to the extent that they have developed, I think they have taken the cream of our lighting from us.

Because electric lighting is in competition with gas lighting?—It is not in competition with gas lighting for general purposes, but for places where expenditure is not considered—such as at restaurants, hotels, and clubs.

Electricity does not compete with gas except for the more luxurious style of lighting?—That is so.

Gas is cheaper, and it is only the rich people who can have electric light; but still it may come to pass that the poorer people may take to electric lighting?—I do not think so.

You are confident that gas would be able to hold its own?—Perfectly.

Take London, for example. Do you think electric lighting would be very likely to develop if the only people to supply it were the Gas Companies?—Yes; I will give you the answer that has been given to me. The people who would use the electric light would want the gas in their kitchens and passages; they would like to have both, and to be able to get both from the same parties.

You do not think there would be a tendency to keep up the price of the electric light if the gas companies, who are interested in a commodity which they are already selling, had charge of the electric lighting?—I assume they would take as much interest in their capital invested in electric lighting as they would in their other capital.

The CHAIRMAN: The Committee are of opinion that we should not go into the question of enabling the Company to supply electricity under this Bill. With reference to the application for a Provisional Order, we are considering that; but as far as the application of the capital given under this Bill to supply electricity goes, we are unanimously of opinion that we could not allow it.

Mr. SAUNDERS said he wanted to discuss the principle as to whether it would be right, under any circumstances, that a gas company, of all people, should have parliamentary powers to apply for a Provisional Order.

The CHAIRMAN: The Committee have come to a decision that they cannot give the Company the right to use their money in providing electricity; but you go further, and say that they are not to use their money in applying for an Order.

Mr. SAUNDERS said that was so, and that there should not be a direct sanction given by a Parliamentary Committee to apply for a Provisional Order, because it might be argued afterwards that the feeling of Parliament was that a gas company would be very proper people to have such an Order. They could not apply for an Order without the expenditure of money; and certainly they could not apply under their existing Acts of Parliament. A Provisional Order, after all, must come before Parliament, and if it was to be sanctioned it must cost them some thousands of pounds; and therefore the Corporation certainly asked that the whole of the clause relating to electricity should be eliminated, on the ground, amongst other reasons, that a Company who are supplying gas are not the proper people to be allowed to enter into the competitive means of lighting, which it would, of course, be to their interest not to develop, but, on the contrary, possibly to suppress.

In further cross-examination by Mr. SAUNDERS, witness admitted that the Company's accounts showed that the total net revenue of the gas and water undertakings in 1889 was £9265; that the maximum dividend amounted to £7400; and that the interest came to £402—leaving a balance of £1463, which represented the excess of profit over the 8 per cent. dividend. The learned Counsel added that there was £185 income-tax paid in excess; whereupon witness said he was not an accountant, and therefore was not prepared to go into these figures. Questioned as to clause 43, by which the Company are at liberty to take out of the water reserve fund any amount they think fit, and pay it into the dividend account, before the dividend is declared, witness said they were only to be allowed to pay a dividend of 8 per cent. upon the water capital.

Mr. WORSLEY-TAYLOR said that all that was intended was that the Company should be able, from the reserve fund, to make up the amount limited for dividend; and if the words in the clause did not carry out this intention, the promoters were quite willing to insert any others that would do so.

Mr. SAUNDERS then addressed the Committee on behalf of the Corporation, and, at the outset, disclaimed any hostile intention. The relations between the Corporation and the promoters had, he said, always been amicable. The Company was of a thoroughly respectable kind, and had done their best; and naturally it was not the desire of the Corporation to deprive them of any reasonable powers for increasing the capital of the undertaking which might really be necessary. They did, however, protest against too large an amount of capital being given, so as to avoid the lapse of an undue length of time before the Company were obliged to come to Parliament again. There was evidently a willingness on the part of the Company to come to terms with the Corporation for the purchase of the undertaking. His clients were not going to propose a compulsory purchase clause; but, on the other hand, they did not want to see anything done which would render it less likely that the Company might amicably come to terms with them. A month ago the negotiations were so active that a reference to them was embodied in the Directors' report to the shareholders; but now they were suspended, and might be said to be over for the time. However, he had no doubt the Company would be willing vendors if proper terms could be arrived at. Of course, it was for the Corporation to see that fresh pecuniary obligations were not imposed upon the Company, nor fresh pecuniary advantages of an inordinate character conferred, which would undoubtedly have the effect of enhancing the price to the public authority. In regard to the water undertaking, the Corporation would be perfectly content that the Company should have the whole amount which they had shown they wanted, and which he contended was £25,000. This would be obtained by putting in powers for £10,000 more capital, and £2500 borrowing powers in addition to the £12,500 unexhausted. With regard to gas, he contended that Mr. Jones did not show a requirement for more than £40,000. That gentleman assumed that in 14 years the Company would need double the quantity of gas they at present supplied; but he did so by assuming a 5 per cent. compound increase each year. Canterbury, however, was, and had been stationary in population. The calculation, therefore, ought to be by a simple percentage. In the five years from 1884 there had been an increased supply really of only 3 per cent. per annum. The sliding scale and the electricity clause were the only two points upon which the Corporation felt so strongly that they desired to take the opinion of the Committee upon them. They had formed a strong opinion against the sliding scale. Mr. Charles Hawksley would say that, upon the whole, it was not, in the public interest, a desirable thing, at all events as far as Canterbury was concerned, to adopt the sliding scale. If the standard price and dividend could be fixed at a better figure, perhaps some of the objections against the scheme would not prevail. If the Company were going to make the standard price 3s. 6d., when the actual price was now 2s. 10d., the object of the sliding scale vanished; but if 2s. 10d. were put into the Bill, there would then be a reduction in the price, which might be a sufficient bribe to the Corporation to consent to it. With regard to the electricity clause, it was generally understood that electricity and gas were distinctly competing illuminants, and that the prospects of electric lighting in the future very much depended upon the extent to which independent capital could be brought in for the purpose of keeping gas companies in order. He believed there would be nothing more detrimental to electric lighting in the future than to hand it over to the companies who were already supplying gas. This Company really wanted to be able to go to the Board of Trade and spend the money provided for gas and water either in opposing other people getting Orders for electric lighting, or in getting one themselves; and when they had obtained it, would never do anything with it.

Mr. *C. Hawksley*, C.E., examined by Mr. BAGGALLAY, said he had inspected the existing gas and water works of the Company, and the site for the proposed works. He considered that the figure mentioned by Mr. Hassard—£16,500—*plus* £2000 for working capital, would be all that was required to be expended on the water part of the undertaking. The proposal of the Company to have £25,000 share capital and £6250 borrowed capital, in addition to the unexhausted borrowing powers, seemed a larger sum than they were likely to require within the next 15 or 20 years. With regard to the gas undertaking, he did not quarrel with the figures given by Mr. Jones as to the cost of the works to make the quantity of gas for which he estimated. Where he differed from Mr. Jones was that that gentleman assumed that the consumption of gas would increase in Canterbury so as to require that expenditure within the next 14 years. It appeared to him that, taking the rate of increase for the past five years, this expenditure would provide for a period of more than 30 years; and he doubted whether, having regard to the fact that the population of Canterbury had been stationary for the last 30 years, the rate of increase which had been observed in the past five years would be maintained. He should think that a total sum of £40,000 would provide for the wants of the next 20 years. He was not in favour of the adoption of the sliding scale in connection with this Company. He thought the operation of the sliding scale must inevitably be in favour of the shareholders, unless some extraordinary rise in the price of materials or labour occurred, which was not at present looked forward to. He was of opinion that the Company must see their way to gain by that, otherwise they would not seek to change their present maximum dividend with a sliding-scale one.

Mr. BAGGALLAY: Do you consider that the sliding-scale tends, as a rule, to improve or otherwise the class of works which are erected?

*Witness:* I think it has a contrary effect. The greed for large dividends has become so great that everything is done to reduce the price of gas to the minimum; consequently, inferior structures are erected, with the result that, in a few years' time, they will largely increase the cost of maintenance. It is also the desire to reduce the price of gas in order to divert attention from the quality of the gas supplied; and therefore, under the sliding scale, the public are never likely to get anything better than the minimum which is allowed by Parliament.

Examination continued: He did not think the consumers in Canterbury would benefit from the introduction of the sliding scale. On the other hand, he believed the shareholders would at once receive 1¾ per cent. dividend on their entire capital, including both gas and water stock. The published accounts of the Company showed that in 1889 they made an excess of profit of £1463, to which must be added the £185 excess payment on income-tax: making an excess of profit of £1648, which on their present capital was rather more than was required to pay 1¾ per cent.

Cross-examined by Mr. LITTLER: He did not know any instance where, the sliding scale being in existence, the prices had not been

reduced; but, on the other hand, he did not know any instance where the sliding scale had operated to reduce the dividend. His own impression was that the sliding scale was having the effect of deteriorating the Metropolitan works. There was a general desire now for very slight works; and he thought this was largely due to the sliding scale. He admitted that, if this were the case, a terrible vengeance would come on the companies, because they would have later on to renew their works at a great cost, and away would go their dividends; but this would not be out of the pockets of the present investors. He inspected the Company's works on the previous Saturday; he had only been to Canterbury once before. The nearest works with which he was connected were those at Tunbridge Wells and Folkestone.

Mr. LITTLER then addressed the Committee on behalf of the promoters; and the room was afterwards cleared.

The Committee having deliberated for nearly three-quarters of an hour, Counsel and parties were called in.

The CHAIRMAN announced that the Committee were of opinion that the preamble of the Bill was proved; but they had come to the conclusion, with regard to capital, that that for gas should be reduced to £36,000, and that for water to £15,000. They approved of the sliding scale; and they fixed the standard price of gas at 3s. 4d. With regard to the electricity clause, they agreed to the power to make application for a Provisional Order; but they did not sanction the expenditure of capital in the supply of electricity.

**Thursday, March 20.**

On the re-assembling of the Committee to-day,

The CHAIRMAN stated that, in announcing the decision of the Committee on the previous day, he had made a mistake in reference to the electricity clause. The Committee were prepared to grant power to the Company to apply for an Order, but not to go further. He had not quite clearly understood the meaning of the Committee. Practically, they were unanimous in saying that it would be better to eliminate the clause altogether.

Mr. WORSLEY-TAYLOR undertook, on behalf of the Company, to isolate the street services and to construct a new main within five years, as suggested by Mr. Hassard.

The clauses were then gone through; and the Bill, as amended, was ordered to be reported to the House.

## LEGAL INTELLIGENCE.

### LEEDS ASSIZES.—Tuesday, March 25.

(*Before Mr. Justice* DAY *and a Special Jury.*)

**The Mayor and Corporation of Salford v. Lever.—The Hunter Commissions.**

To-day the long-pending action brought by the Salford Corporation against Mr. Ellis Lever, for the recovery of certain sums alleged to have been paid by him, in the way of commissions, to Samuel Hunter, formerly their Gas Engineer, came on for hearing. The attendance in Court was not very large, owing to the fact that only those who were specially interested in the proceedings were allowed to enter. Among those present were the Mayor of Salford (Mr. B. Robinson), the ex-Mayor (Mr. Alderman Dickins), a number of Aldermen and members of the Corporation, and the Gas Engineer (Mr. S. Y. Shoubridge). Hunter, who had been taken to Leeds some days previously, was in attendance, wearing ordinary dress, and appearing in better health than when he was convicted.

The Solicitor-General (Sir E. Clarke, Q.C., M.P.) had been retained as leading Counsel for the Corporation—the services of the Attorney-General (Sir R. Webster, Q.C., M.P.) having been secured for the defendant; and it was expected that both would be present. But it transpired that as, owing to the defendant's ill-health, he was not likely to appear in the witness-box, it had been mutually arranged between the parties to save the expense of bringing down the two Law Officers of the Crown. Accordingly, Mr. S. D. WADDY, Q.C., M.P., and Mr. C. GOULD (instructed by Mr. S. Brown, Town Clerk of Salford) appeared for the plaintiffs; and Mr. LOCKWOOD, Q.C., M.P., and Mr. LAWSON WALTON, Q.C. (instructed by Messrs. Godfrey Rhodes and Evans), for the defendant.

Mr. GOULD opened the proceedings by stating that the plaintiffs were owners of the gas-works at Salford; that Samuel Hunter was their Manager and confidential agent; that by three contracts the defendant agreed to supply them with certain large quantities of coal, amounting to 58,300 tons; and that the contracts were corruptly obtained by bribing their servant with a secret commission of 1s. a ton to induce them to enter into contracts. They therefore claimed damages. In the defence, the defendant admitted the plaintiffs' proprietorship of the gas-works and the making of the contracts, but denied that the contracts were corruptly obtained, or that he agreed to pay the alleged commission. There was an amended paragraph, in which it was alleged that, if the defendant paid the moneys in question, Hunter paid the same to the plaintiffs, or accounted to, or compounded with them, on condition that plaintiffs should seek to recover as trustees for Hunter. Upon this defence issue was joined.

Mr. WADDY then opened the case. He began by asking the jury not to let anything they might have read about the matter they had to deal with weigh with their judgments; and said he thought that with the facts before him he would be able to show that the plaintiffs were entitled to claim at their hands a considerable sum of money from the defendant. It was equally law and common sense that no man could serve two masters; and a servant was not entitled to make use of his position for the purpose of making money out of it to the detriment of his master's interests. Shortly, he alleged that Mr. Ellis Lever bribed corruptly a servant of the Corporation, who by his position was enabled largely to influence certain contracts which the Corporation had to make for coal; and that, as a result of this bribing, the defendant obtained those contracts from the Corporation. In this matter it was hard to fix the maximum amount of loss sustained by the plaintiffs. But it was not at all difficult to fix the minimum; and this was the amount he would claim. Supposing the jury should find that Mr. Lever had been giving to Mr. Hunter a bribe of (say) 1s. a ton upon the coals bought, he ventured to think this was the minimum amount he was entitled to claim; and that view was put in a very few words for him by the Master of the Rolls. He would read what was said.

Mr. LOCKWOOD objected to anything being read which the learned Counsel was not prepared to prove.

Mr. WADDY said he would not read the report; but what he desired to show was that gross and corrupt bribery had taken place, and that if Mr. Lever gave Hunter a bribe of 1s. per ton, he probably got more than that out of the Corporation. Proceeding to detail the circumstances, the learned Counsel referred to the appointment of Hunter as Gas Manager, in succession to Mr. Hall, in 1875, and pointed out that, in connection with the contracts for coal and cannel, so much was left to him that it was an easy thing for him to give the weight of his influence to this or that firm, although their tender might not happen to be the lowest. In December, 1875, it became necessary to enter into contracts for coal and cannel; and Mr. Lever tendered—making an arrangement with Hunter that, if he obtained the contract, he would pay him a bonus of 1s. per ton. It was then that Mr. Lever entered upon the system which he had carried on for a number of years. Hunter had his commission on this contract; and also received large sums of money, amounting to £1500, from Mr. Lever on others. There was a considerable amount left over, which Mr. Lever never paid, with the result that a quarrel arose between him and Hunter; and, when these two people fell out, an opportunity arose for the Salford Corporation to get their due. However this was, an arrangement was made between these two gentlemen that, whatever might be the quality and price of the coal offered by Lever, Hunter was to receive 1s. per ton upon it if the tender was accepted. At a meeting which took place in October, 1876, the price at which Lever should tender was actually arranged beforehand. The result of this was that, on the 17th of July following, a contract was entered into; and he would be able to show that at that very time the particular kind of coal which Lever induced Hunter to purchase from him for the Corporation was actually selling in the market at something like 2s. (or even more) less than the price which was obtained from the Salford Corporation. On Sept. 19, 1877, tenders were invited for more coal. Mr. Lever had already fixed the amount of the bribe; and the jury would not be surprised to hear that the other people who tendered had very little chance. The tenders were formally opened by the Gas Committee on the 3rd of October; and Mr. Lever tendered for 16s. per ton for one kind, and 11s. 6d. per ton for another. It was thought that this was too high; so Hunter was instructed to negotiate with Mr. Lever for a reduction of the price to 15s. per ton. Mr. Lever replied that he was only able to reduce the price by 2d. per ton in the first case, and could not reduce the second lot at all. The result arrived at was to accept the tender on these terms; and a certain sum of money was handed over by Lever to Hunter. Lever was not in the habit of paying his bribes regularly. He paid in large sums of £50, £100, £200, and in one case £250. On this particular occasion £200 was paid to Hunter; but the subsequent payments were very irregular, and Hunter became angry. Lever made charges against Hunter which, no doubt, he felt safe in making, because it occurred to him that Hunter dared not "peach." He charged Hunter with having obtained bribes from other colliery owners, and in one case with obtaining money from Mr. Wrigley, with which he had been able to visit Egypt and Palestine. Hunter was indignant; and declared that the charge was not true—as it was not, in truth, for he had the money from Lever himself. Lever was sufficiently ill-advised to write a letter; and Hunter's Solicitors demanded an apology. At that time Hunter was, apparently, a man of position—keeping hunters, and living in a style of luxury. About this time Lever was something like £800 behind in his payments. The 1s. a ton amounted to nearly £2400; and Hunter had received only £1500. Hunter was naturally anxious that the equitable transaction made between them should be carried out to the fullest extent; and he urged upon Lever the settlement of this debt of honour. Lever did not feel disposed to, and actually did not pay; and the jury would not be surprised, for he found, to his dismay, that he was not going to get the contracts. Trouble began to arise between the two men; and, stung by the wrong that was done him, Lever wrote a remarkable letter to the Chairman of the Gas Committee (Mr. Alderman Sharp) exposing Hunter. At that time Lever was never suspected of being himself a defaulter. He was posing as the discoverer of wrongs, as the man who was to set everything right, as the purist who was attempting to purge Salford and the Corporation of any scandal and any impropriety. And he was positively accepted at his own price for a considerable length of time, until a full investigation developed the fact that he was perhaps, not only as bad as the people he had been exposing, but probably worse. The outcome was an action for libel, brought by Hunter against Lever. The cloak of religion and charity was brought in to cover the affair; and Hunter demanded, first of all, £250 to be paid, an apology given, and £100 paid to some charitable fund. A letter was afterwards sent by Lever to Hunter, in which regret was expressed that Hunter's Solicitors had not received instructions not to proceed further with the action for libel, and adding: "When I paid you the £250 on Tuesday, I did so on your assurance that no further action should be taken, and that you were satisfied that I had done all I could to put you right." It had been suggested—and it was perhaps a very natural suggestion to make—that this £250 had been paid in settlement of the libel action; but this was not so, because the penalty was afterwards fixed at £50, and in due and solemn form, these gentlemen went to Brunswick Chapel, Pendleton, on the occasion of the anniversary services, and the £50 cheque was put into the plate as the atonement to be made by Mr. Lever to Mr. Hunter to wipe out the stains of the calumny that had been poured upon him. It only wanted a thing of this kind to complete the act of rascality. Shortly after this time, however, some dispute arose between Hunter and Lever with regard to undelivered coal; and Mr. Lever sent a telegram which lighted up the flame. It was as follows:—

To James Farmer, Esq., Mayor of Salford, Town Hall, Salford. [Private.] Let me caution you against affixing the corporate seal to certain coal and cannel contracts. Bribery, corruption, and fraud have prevailed in your

borough to an enormous extent for many years; and I am sure you will be ready to stamp out the offence. and save your people from being robbed as they have been for many years.—ELLIS LEVER, Bowdon.

Bravo, Mr. Lever! The statement that the Corporation were being robbed of thousands of pounds a year must be accepted, as it was made on the very highest authority. These attacks on Hunter were so persistently kept up that at length something had to be done. Hunter was compelled to take action against Lever, with the result that Hunter was afterwards convicted of perjury and forgery. Then followed Chancery proceedings for the restitution of the moneys which had been paid in bribes; and an arrangement was come to with regard to certain suits then pending—an arrangement which was, however, quite immaterial to the present action, and which was actually entered into before the proceedings against Lever had commenced. The result of certain things which came to the knowledge of the Corporation was that it was considered necessary to go one step further, and take action against Lever, who had given, on three contracts alone, something like £2329 to a man who had a salary of £500 a year. It was said that Mr. Lever was ill, and unable to go into the witness-box. No efforts had been made to examine Mr. Lever on commission; but he did not find much fault with that, as Mr. Lever had already given his evidence in the form of answers to interrogatories. Damning as was the evidence he had already submitted to them, he (Mr. Waddy) thought it would be admitted that the most conclusive testimony was that which Mr. Lever himself had given in this action on oath. Fourteen interrogatories had been administered to him; and he had answered four of them. What did he say as to the rest? "As to each and all of the remaining interrogatories, I say that I am advised"—and the advice was good—"that I am under no obligation to reply thereto; and I decline to answer the same, on the ground that my answers to the said interrogatories might tend to incriminate me." Now let them see what Mr. Lever could not answer without incriminating himself. There was a time—when Hunter was in the box—when he must either answer and incriminate himself, or commit perjury. Mr. Lever was now in the same fix. They would not have seen him there that day if he had been as strong as a lion. He would not have incriminated himself. One of the interrogatories was to this effect: Did he not agree to pay commissions to Samuel Hunter on the coal delivered at the gas-works under his contract? He declined to answer that; and said, "If I do, I criminate myself." Question No. 4 was, "Did you agree to pay to Hunter as the said Gas Manager 1s. per ton?" The answer was, "If I tell you the truth I shall criminate myself." If it was not true, the answer was ready—"No." But he knew better. The fraud in question might be wiped out by the verdict of the jury; but if Mr. Lever had ventured to commit himself on oath he might have had to answer—not on that side, but on another side of the Court. So far he had acted wisely in saying he did not and could not answer the questions without committing perjury or telling the truth, by which he would incriminate himself. Upon that answer he (the learned Counsel) ventured to think everything might well be allowed to turn. He might have a tainted witness, if they liked, in Hunter; but he called in vain for the witness who remained untainted, solely because he wisely declined to incriminate himself. He asked the jury to give him a verdict for at least 1s. a ton upon the whole of the contracts. Mr. Hunter would tell them that he bargained for a commission upon the whole, and that a great portion of the money had been paid to him, and they might depend upon it that this was a very moderate measure indeed of the amount which had gone out of the pockets of the Salford ratepayers into the pockets of Mr. Ellis Lever.

The following evidence was then given:—

*Samuel Hunter*, examined by Mr. GOULD, stated that in 1875 he was appointed Gas Engineer to the Salford Corporation, at a commencing salary of £500 per annum; and this was increased in two or three years to £700, with out-of-pocket expenses. He had the control of the gas-works and the ordering of the coal under the direction of the Gas Committee, of which Alderman Sharp was the Chairman. Large quantities of coal and cannel—about 80,000 tons—were consumed annually. It was part of his duty to advise the Committee on the tenders for coal; and the practice was to advertise for the supply. As a rule, the supply was triennial. In December, 1875, it became necessary to procure an additional quantity of coal; and he was authorized by the Committee to negotiate the purchase of about 60 tons. Mr. Ellis Lever was a large coal merchant whom he had known at Rochdale, where he had previously been engaged as Gas Engineer, and he entered into communication with him. He gave him an order, arranged the price, and made an agreement that Lever was to pay him 1s. per ton commission. This agreement was arranged at the Gas Office, in Lamb Lane, and was an offer of Lever to pay privately 1s. on every ton of coal supplied and paid for. It was a very exceptional arrangement, because it was an exceptional order. Lever simply included the 1s. in the price he charged the Corporation. On Dec. 16, 1875, Lever sent in a written offer; and an agreement was made for him to supply 820 tons. In June of the following year, advertisements were inserted in the newspapers inviting tenders for the supply of coal; and Lever sent in a tender. He made an offer for 20,000 tons; a subsequent tender being for 30,000 tons more. Lever told him that if his tender was accepted he would pay him 1s. per ton as before. He (Hunter) advised the Committee to give an order for 20,000 tons of Nottinghamshire cannel at 13s. 6d.; and the Committee accepted the tender on Aug. 3, 1876. Some difficulty arose owing to Lever not being able to supply the coal; and consequently none was delivered. Fresh negotiations were entered into with him; and, as the result of an interview, Lever sent in tenders offering 30,000 tons. It was arranged that he (Hunter) was to have 1s. per ton commission as before; and he recommended the Committee to accept a tender for 24,000 tons of coal, which they did. The coal was all delivered. On June 20, 1877, there was again occasion to invite coal supplies; and he wrote to Lever seeking an interview. He called on Lever, and the latter inquired what material was wanted. On being informed, he suggested some Shirland coal, of which 20,000 tons were needed. He quoted 16s. for the cannel, and for coal at 11s. 6d. The Committee considered that the price of the cannel was too high; and a resolution was passed instructing witness to negotiate with Lever for a reduction. He saw Lever, but did not succeed—Lever only offering to reduce the price of the cannel by 2d. The Committee accepted the offer, and the contract was entered into. Mr. Lever from time to time paid various sums on account of the commission; and money had also been paid to witness's wife and son. One sum was by a cheque for about £40. Witness objected to the cheque, on account of the secrecy of the transaction. He wanted Lever to get it back from the bank; but Lever said, "Let sleeping dogs lie." Witness remembered receiving £200 from Lever in February, 1876, before going to the Mediterranean. In accordance with custom, Lever paid him a sum of £200, a portion of which he used in defraying his expenses. In March, 1881, he met Lever by appointment at the Star Hotel, Deansgate, Manchester, and received from him £250. The total amount due by Lever to him for bribes was £2329, of which he had received £1500. Between the years 1881 and 1886 he made repeated claims upon Lever for the amount unpaid. During that time Lever sent in various tenders to the Corporation, but was unsuccessful. Witness gave further particulars as to Lever's payments to him; saying that the earliest specific payment he could recollect in respect of commissions was one of £200 made at the Waterloo Hotel. Mr. Lever had promised to bring the money with him; but had not got it when he arrived. He sent his clerk, Peacock, to the bank for it. He gave as a reason why Peacock could be trusted, that he was his confidential clerk, and knew exactly what the money was for. Lever added that Peacock was the son of the then Gas Superintendent in Manchester, to whom, he alleged, he paid commission exactly as he did to him (Hunter). Witness further stated that during his absence in Palestine he left instructions that the payments were to be made to his wife.

Cross-examined by Mr. LOCKWOOD, witness gave the names of the members of the Gas Committee when he entered upon his engagement at Salford; and said that during the time he was under the Corporation there were a great many changes. In all cases he acted under the direction of the Gas Committee; but he advised the Committee.

Mr. LOCKWOOD: You suggest that you were bribed by Lever and by others—in fact, always bribed?

*Witness:* Yes.

Do you represent that in each case before the Committee you advocated the contract in respect of which you were to receive a bribe?—Yes. But if you put it that I received commissions upon all orders given by the Committee, or orders advised, I say: No; only on some of them.

Were you on good terms with the Committee?—Yes; but not individually. There may have been one or two I could call personal friends.

So far as your position is concerned with regard to receiving the bribes, was it known to any member of the Committee?—No; not so far as I know.

Did Lever never pay you any money to expedite wagons which had been delayed, and on which heavy demurrage was charged?—Not a farthing; it was never mentioned.

In further cross-examination, witness stated that when his wife went to Lever for money it was by his directions. It was arranged that she should go as far as Paris to meet him; and she wanted an advance of money for the purpose. When he swore at the trial of the criminal action he brought against Lever that he had not been bribed, he did it to protect Lever as much as himself. He was tried on March 19, 1888, for perjury and forgery at common law. An action was commenced against him by the Corporation, in the Chancery Division, in May, 1887, on the ground that he had, with fraud, obtained commissions and profits in connection with the supply of goods to the gas-works, and claiming from him the moneys so received. He first made a verbal offer to the Corporation at the latter end of 1887—long before his conviction. The then Town Clerk (Mr. J. Graves) approached him, and advised him to settle. Witness instructed his Solicitor to take that course, and he promised to do so; but instead of this witness was arrested. He told the Town Clerk that whatever amount he could prove he would instruct his Solicitor to pay. The Town Clerk said that the Corporation had no information as to anything exceeding £1000, and that a reasonable sum would settle it. Witness then said, "Go to my Solicitor, and I will settle it."

The Court then adjourned for luncheon. On resuming,

Mr. LOCKWOOD asked to be allowed to interpolate the evidence of Dr. Broadbent as to the then state of Mr. Lever's health.

His LORDSHIP said he could not admit such evidence at any stage of the hearing.

Mr. LOCKWOOD said he wished to give a reason for the non-attendance of Mr. Lever.

His LORDSHIP said all he knew was that Mr. Lever was not there, and that he had not taken the precaution to have his evidence taken on commission, as he might have done.

Mr. LOCKWOOD said he could prove that the taking of Mr. Lever's evidence, either in the Court or on commission, would be dangerous to his life.

His LORDSHIP said Dr. Broadbent's evidence would only be important if he (the Judge) were asked to issue a commission to examine Mr. Lever.

*Hunter* was then cross-examined with regard to the negotiations which took place between him and the Corporation, after his conviction, on Feb. 2, 1888 (from which date he was respited till the following July), with a view to his making restitution of the money he had obtained. He acknowledged that during these negotiations he did not give the Corporation all the information in his power; but he gave them what they asked.

Mr. LOCKWOOD: Did you mention to the Corporation at any time the names of persons whom you alleged bribed you?

*Witness:* No. They did that in the statement of claim to me. I had no occasion to mention them.

What amount of restitution did you offer to the Corporation? I offered all I was worth to get out of my difficulties; it might be £20,000.

At this stage a letter, written by Hunter's Solicitor, offering the whole of his property, valued at about £20,000, in settlement of the Chancery proceedings then pending (although it was stated that such

a payment would leave Hunter penniless except for a life interest he would have in a settlement), was read and put in.

Mr. WADDY objected that if there was an agreement it must be in writing, and ought to be produced in that form.

Mr. LOCKWOOD: My object is to show that in this matter the Corporation of Salford are merely a litigating machine for the man who now stands in the box.

Mr. WADDY: Even if it were so, that would be no defence to the action.

Mr. LOCKWOOD: I wish to show that negotiations took place, and an agreement was entered into, by the terms of which the Corporation agreed to receive, as I shall contend, in full discharge of all claims which they might have against any contractors, a certain sum from Hunter; and they further agreed to commence actions on his behalf against the contractors, and to credit him with the sums which they might recover in the actions—he undertaking to pay the costs of such litigation.

Mr. WADDY: The agreement existing, as I shall suggest, is a very different thing from that represented. The difficulty is that the agreement in question was made before this action was taken, and has nothing to do with, and does not include, Mr. Lever.

Justice DAY: You admit the existence of this agreement, so the sooner it is put in the better.

Mr. WADDY: The agreement is a memorandum—not between the Corporation, but by Mr. Brown, the Town Clerk.

Justice Day: Acting on behalf of the Corporation. The sooner we come to the document the better.

Mr. LOCKWOOD: I press the question whether the Corporation did not bargain with this man that if the agreement were entered into they would petition the Home Secretary for his release. I shall submit that this throws discredit on the parties.

Mr. WADDY objected to the question.

His LORDSHIP upheld the objection, as the point was not material to the issue.

A copy of the agreement was then handed to his Lordship, and a portion of it read. It was in the following terms:—

1. Hunter to deposit forthwith, in the Lancashire and Yorkshire Bank, King Street, Manchester, securities which the said bankers will guarantee shall realize the sum of £10,000, in the name of the Mayor of Salford and J. C. Walker (Hunter's Solicitor), such securities to remain in the hands of the bankers until the date hereinafter named, as a guarantee that the sum of £10,000 will then be paid over to the Corporation of Salford on the date hereinafter mentioned, and the bankers shall give such a guarantee.

2. The Corporation shall, at the request of Hunter, proceed with any pending actions against former contractors with the Corporation, or at the instance of Hunter institute further actions against such contractors, for the purpose of recovering any bribes or commissions received by Hunter, or promised to be paid to him from such contractors.

3. Hunter to give such information and evidence as may be necessary for the purpose of any such actions or proceedings, and also to pay all costs of or incidental to any such actions or proceedings from this date.

4. Any sum of money that may be recovered and received in any such actions or proceedings, or which may be paid either to the said Samuel Hunter or to the Corporation by any contractors by way of settlement without action or after action brought (and as to the sufficiency of such payment the said Samuel Hunter shall be the sole judge) shall be paid over to, or retained by the Corporation; and after deducting costs therefrom the net balance shall be taken in part satisfaction of the sum of £10,000—it being understood that the Corporation are to receive a clear sum of £10,000 irrespective of a sum of £442 10s. (some time since received by the Corporation), and all costs and expenses as before mentioned, and no more.

5. On the 31st day of December, 1889, in case the Corporation shall have been unsuccessful in recovering any sum or sums of money in connection with the said actions or proceedings, the said securities, or a requisite part thereof, shall be realized, and the sum of £10,000 shall be paid over to the Corporation, and the said Samuel Hunter shall, in addition thereto, pay to the Corporation all costs and expenses of and incidental to the said actions or other proceedings which they may have incurred and cannot recover from any other person, or become liable to from this date until the said 31st day of December, 1889; and in case the Corporation succeed in recovering and receiving any sum less than the said £10,000, then the difference between such sum as may have been so received (after deducting all costs and expenses as aforesaid) and the said sum of £10,000 shall be paid over to the Corporation.

6. The Corporation shall, at any time prior to the said 31st day of December next, at the request of the said Samuel Hunter or his Solicitor, discontinue all or any such actions or proceedings as before mentioned, and thereupon the said sum of £10,000 shall be payable to the Corporation, together with such costs as before mentioned.

7. On the receipt by the Corporation of the said sum of £10,000, together with all such costs and expenses as aforesaid, the Corporation shall give to the said Samuel Hunter a full and complete discharge; and in the meantime they shall take no step in the Chancery action pending against him and one John Greaves Hawkins, but the same shall be stayed.

8. Upon payment into the Lancashire and Yorkshire Bank of any sum of money (to the credit of the Mayor of Salford and J. C. Walker) received from contractors as aforesaid, the said Samuel Hunter shall be entitled to receive and have returned to him a corresponding portion of the said securities deposited. And upon being satisfied that any contractor has paid a sum satisfactory to the said Samuel Hunter as aforesaid, the said Corporation shall thereupon give to the said contractor a complete and sufficient release from all claims in connection with the said matters.

I agree to this, as appears in black, red, and green inks.

*Aug. 6, 1889.* (Signed) SAML. HUNTER.

Mr. LOCKWOOD: Where was that agreement entered into?

*Witness:* In Strangeways Prison.

Mr. WADDY pointed out that the agreement was entered into at a time when it was known that Mr. Lever had been guilty of fraudulent practices.

His LORDSHIP said this appeared to be so; and the question was, if the Corporation had a cause of action at that time, what had this witness done to be able to deprive them of it.

Mr. LOCKWOOD said they had, by their agreement with Hunter, deprived themselves of their right of action now.

Mrs. *Hannah Hunter*, wife of the previous witness, was then called, and stated that she was aware of the agreement with regard to the payment of certain sums by Mr. Lever to her husband as commission. She had been present at conversations in relation to the matter.

His LORDSHIP (interposing) asked whether it was really necessary to go into this. They had already heard the evidence of Mrs. Hunter's husband. As he understood, the defendant did not propose to call any witnesses; the defence being on a point of law.

Mr. LOCKWOOD said he must not be taken as admitting that the bribes had been given by Mr. Lever. He was unable to call Mr. Lever to give evidence.

Mr. WADDY said he had other witnesses; but in view of his Lordship's remark, he would only call one of them.

Mr. *F. Saxton*, formerly a coal agent dealing with the Manchester Corporation, was then examined, and stated that in March, 1877, the figure he quoted for cannel was 15s. 10d. per ton. From that time, however, the price fell considerably; and he subsequently sold to the Corporation at 14s. per ton delivered.

This closed the case for the plaintiffs.

Mr. LOCKWOOD said he had two points to submit as to the agreement which had been put in. His Lordship would see that the Salford Corporation undertook, at the request of Hunter, to proceed with any pending action against any former contractors (no names being given), or at the instance of Hunter to institute further actions against such contractors.

Justice DAY: That clearly includes this action.

Mr. LOCKWOOD: Clearly. The agreement continued: "For the purpose of recovering any bribes or commissions received by Hunter or promised to be paid to him by such contractors." Then Hunter undertook to give such information and evidence (as he had done) as might be necessary for the purposes of any such action; and he was also to pay all the costs. Any sum of money recovered in the action was to be held by the Corporation in security. He (Mr. Lockwood) submitted that the Corporation could not be in any better position than Hunter; and that as far as Hunter was concerned, it was clear he could not recover. Those were the points he would submit at this stage, which he hoped was the ultimate one.

His LORDSHIP remarked that he could not give judgment until he had heard the whole.

Mr. LOCKWOOD replied that he would not have made the statement he had done unless he had been willing to abide by his Lordship's decision.

Justice DAY: I am with you on both points. How far they are applicable to this case is another thing.

Mr. WADDY: What I venture to say is that any sum of money recovered in this action cannot be governed by the agreement, because, with great respect, I think that the construction my learned friend has put upon it is altogether wrong. His construction was that the Corporation should not proceed with any pending action against former contractors. The question must be, first of all, what was known to the parties at the time. This agreement must be read by the light of what was then present in their minds. Mr. Lever's action was not begun.

Mr. LOCKWOOD said it was a matter of construction, and he was bound by his Lordship's view.

His LORDSHIP pointed out that the Corporation had a right of action quite irrespective of the agreement.

Mr. WADDY said he could show that the sum paid into the bank was short, by some thousands of pounds, of the £10,000 which Hunter agreed to lodge. It amounted, in fact, to £6404 15s. 8d.

His LORDSHIP remarked that it would be as well to have all the evidence and facts they could obtain with a view of avoiding a rehearing of the case. At his suggestion,

*Hunter* was recalled, and, in answer to Mr. LOCKWOOD, said that he deposited at the bank, after the agreement, bonds and shares of the estimated value of £10,000.

Mr. LOCKWOOD: Have you ever heard any objection made on behalf of the Corporation that the securities deposited were insufficient?

*Witness:* Yes; there was an objection raised at first, and then some cash was paid by contractors. As this increased the sum of the security, they were satisfied.

What amount have they recovered on your behalf from contractors?—I have just heard the figures—£6400.

Mr. WADDY took objection to the words "on your behalf." (To witness:) As a matter of fact, any money that has been realized is invested in the joint names of your Solicitor and another gentleman?

*Witness:* That is so.

Has anything been recovered from or in respect of Mr. Lever?—Not one farthing.

His LORDSHIP said he thought it better that he should give judgment then, as there was no substantial point to leave to the jury. He should direct them to find that the plaintiffs were entitled, subject to matters of law to be decided hereafter, to recover from the defendant a sum of £2329, money received as commission, so far as the evidence went, at the rate of 1s. per ton upon coals sold by him to the plaintiffs. He (Mr. Justice Day) would give shortly his reasons for coming to this conclusion. It was clear to his mind—and he did not think it could be disputed—that prior to Aug. 6, 1889, the date of the agreement, the Corporation had an undoubted right of action against Mr. Ellis Lever, which entitled them to recover a sum of 1s. per ton upon the total amount of coal which Lever had supplied to them; this 1s. per ton having been paid by him as a bribe for the purpose of corrupting one of their servants. The defence was that the agreement was a bar to the action against Lever. He failed to see that it had any such operation. The contention of the Corporation was that, by corrupting their Gas Manager, Lever had caused them to pay 1s. per ton more for the coal they purchased than they would otherwise have had to pay. The 1s. per ton was undoubtedly paid by Lever in his fraudulent dealing with this servant of the Corporation; and to his mind the Corporation had an undoubted right—prior, at any rate, to Aug. 6, 1889—to recover this money from Lever. It was said that the agreement had deprived them of that right; but he failed to see it. This was an agreement—whether it was valid or not he did not care to inquire, whether *ultra vires* or not he did not care to consider—whereby the Corporation agreed, in consideration of Hunter in some way or other securing to them £10,000, to let him have (for that was what it came to) all they could recover against Mr. Ellis Lever and other coal merchants who had supplied coal to the Corporation under similar circumstances. The Corporation were of opinion,

and were no doubt advised that they had a right of action against this man. But they desired to secure money as well from Hunter; and they no doubt bargained with him that if he would pay them, or in some other way secure to them a sum of £10,000, he should have the benefit of any recoveries they might effect in respect of the action against Lever and other people who supplied coal in the same way. He must say he saw nothing in that agreement to take away the right of the Corporation. Apart from this, he could not see why the Corporation, when they recovered the money from Lever and other persons, could not do what they pleased with it, and why they could not, subject to the serious objection of the Master of the Rolls, dispose of the money in any shape or way they thought fit, subject again to the principle that the Corporation could only apply funds that came into their hands for purposes for which they were incorporated. As to whether the agreement was, as the Master of the Rolls held, *ultra vires*, and not beneficial to Hunter, he did not care to say; it was not pertinent to the case. He quite understood the grounds on which the Master of the Rolls expressed his opinion. It was as to whether an agreement of this kind could be insisted upon by the parties to it, and whether Lever could say he was relieved from the burden of making compensation for the wrong he had caused to the Corporation. It seemed to him that Lever had no interest in what the Corporation did with the money they recovered from him as compensation; it was utterly immaterial to the merits of the case, so far as Lever was concerned. If they cared to hand over a portion of it to Hunter, for the benefit they derived from him, it was immaterial. He was clearly of opinion that the agreement had no bearing whatever on the relative rights of the Corporation and Mr. Ellis Lever, and he would direct the jury to find for the plaintiffs for the sum due.

Mr. LOCKWOOD asked his Lordship to take note of his mention of the fact that £1500 had been paid; the matter seeming to him to stand on a different footing to that stated.

His LORDSHIP said he did not think there was any validity in the objection, because the Corporation did not sustain wrong by reason of Hunter having had the money, but by reason of their having paid too much for the coals.

Mr. GOULD urged that the money should be paid at once; no evidence having been given of Mr. Lever's means.

His LORDSHIP declined to stay execution later than and including Monday, March 31, unless security to the satisfaction of the Master were forthcoming.

## LAMBETH COUNTY COURT.—Tuesday, March 18.

(*Before Mr.* J. J. POWELL, Q.C., *Judge.*)

**Lambeth Water-Works Company v. Richardson.—Water Companies and their Powers.**

This was an action brought by the Lambeth Water Company against the owner of some houses in East Street, Lambeth; and it raised, for the first time, a question of liability for water-rates under the provisions of the Water Companies' (Regulation of Powers) Act, 1887.

Mr. WASHINGTON, Solicitor, appeared for the Company; Mr. BLOOMFIELD was Counsel for the defendant.

Mr. WASHINGTON, in opening the case, said it was the first that had come up for decision under the Water Companies' (Regulation of Powers) Act, 1887, and would be a precedent for every Water Company in London. The property in respect of which the action was brought was situated in East Street, Lambeth, and was formerly owned by Mr. Richard Smith, who "farmed" the water-rates of the houses, and paid the Company £11 9s. per annum in respect of them. After Mr. Smith's death, which occurred some time last year, the mortgagees took possession of four houses; Mr. Richardson (who was the ground landlord) taking nine—the subject of the claim. At the time of Mr. Smith s death, there was due from him, in respect of water-rates for these premises, £25 10s., which sum the Company claimed from the defendant, together with £2 11s. interest thereon at 5 per cent., which the Act allowed. Mr. Richardson was the ground landlord, and had taken possession of the houses; and therefore he was the owner. Up to 1887 the Water Company had the power to cut off water if the rates were not paid; but the Act passed in that year prevented this being done in cases where the rates were paid by the landlord. Under section 4 of the Act, the water-rate was made a charge upon the house; and it was provided that the amount might be recovered from the owner or occupier for the time being. He (Mr. Washington) contended that under that section, although in the meantime the property might change ownership, the Company could recover from the "owner for the time being," although he might not have been owner when the debt was incurred. Up to the present time this claim had never been disputed.

Mr. BLOOMFIELD pointed out that £4 5s. of the claim arose before the passing of the Act of 1887; and said he did not think it could be successfully contended that the Act was retrospective, and included arrears. Then they came to the question of the owner. The owner was defined by section 72 of the Water-Works Clauses Act, 1847. Under that section, the owner was to be "the person receiving the rents from the occupier," whether on his own account or as agent for someone interested in the premises. This position Smith held, and made an agreement with the Company for the payment of the rates. He did not pay them for three years, and so was in default; and the charge of the Company could only be upon Smith's interest in the premises. Where would be the justice of allowing the hands of the Water Companies to be put into the pockets of the freeholder? The Company contended that they had a right to sue—not the owner who made default, but the owner for the time being. This would be a very unjust thing. He maintained that it was the intention of the Legislature, by the Act of 1887, that the right to sue should be confined to the person who made default.

His HONOR reserved judgment.

### Tuesday, March 25.

Judgment was given in the case to-day.

His HONOR commenced by stating in detail the grounds of the dispute between the two parties, as already set forth, and reading section 72 of the Water-Works Clauses Act, 1847, and section 4 of the Water Companies' (Regulation of Powers) Act, 1887, and then said: Under the circumstances of this case, it was contended for the plaintiffs that Smith having, by agreement with them, paid the rates instead of the tenant, he was the owner, and liable for the rates under the 72nd section of the Act of 1847; and that the defendant, having taken possession of the houses, was now the owner of them for the time being, under the 4th section of the Act of 1887, and liable for the rates claimed, though he was not the owner, within the meaning of the Act, when the rates became due, and that, at all events, the plaintiffs were entitled to have their claim made a first charge upon the property. On the other hand, it was contended for the defendant that, at all events, the sum of £4 5s., which was due before the Act of 1887 came into operation, could not be recovered from the defendant, as the Act had no retrospective operation; and that as the Act of 1847 defined the owner to be the person who received the rent, it was Smith who was liable and in default, and consequently that it was Smith or his representative who was in default, and that it would be manifestly unjust either to charge the defendant or the defendant's property with debts for which Smith's estate was liable. I am of opinion that the plaintiffs are entitled to judgment in respect of so much of this claim as represents the water-rate on those premises which has accrued subsequent to the Act of 1887. The case is governed by section 4 of that Act; and but for that enactment the plaintiffs would have no case against the present defendant. The premises are of an annual value exceeding £10; and therefore by law the water-rate is not payable by the owner. But, by agreement, Smith, the late owner, made himself liable to pay the rate; and so the Act of 1887 applies. By section 4 of that Act, in all cases to which the Act applies, the water-rate is made a charge on the premises; and any construction of it is that since its passing, whenever a sum for water-rate becomes due, the premises are burdened or charged with that sum, and one month after it is claimed, interest at the rate of 5 per cent. becomes payable, and is also a charge on the property. The premises can be, and are relieved of this burden by payment; but until payment the charge continues. Here there has been no discharge by payment; and transfer from one owner to another does not get rid of the charge. If there had been nothing in the section about the money, the plaintiffs would have had to take proceedings in equity to realize their charge out of the property, whoever might be the owner; so that the owner for the time being would in this way have had to pay the amount of the rates due by his predecessor. But the section also provides that the water-rate, with interest and costs, may be recovered "from the owner or from the occupier for the time being," in the same manner as water-rates may by law be recovered—that is, as to one way, at any rate, by action. If the occupier is made to pay, he is entitled to deduct the amount out of his rent; so that in this way again the owner for the time being would have to pay what his predecessor had left unpaid. But the question arises, Why may he not be compelled to pay directly as well as indirectly? It may, I think, be doubtful, having regard to the grammatical construction of the sentence, whether the words "for the time being" apply to more than "the occupier." If they do apply, there can be no question of the defendant's liability; if they do not, the sentence, read simply as "may be recovered from the owner" is, I think, sufficient to enable the plaintiffs to recover from the present owner in this action, instead of necessitating their taking proceedings in equity to have the charge realized; in which case the defendant would equally have to pay. There is nothing in the Act of 1887 to restrict the word "owner" to the owner by whom the rates were originally payable, though in a somewhat similar provision in section 257 of the Public Health Act (where it is intended that summary proceeding shall not be taken against any but one kind of owner) words are introduced to restrict them to "the person who is the owner of the premises when the works are completed." I, therefore, give judgment for the plaintiffs for the amount claimed, less the £4 5s., and interest thereon, claimed in respect of the water-rate due before the Act of 1877 came into operation. I see nothing in that Act to show that it was intended to be retrospective, and consequently am of opinion that as to this amount the defendant is not liable.

**The Warrington Corporation and the Water-Works.**—Voting-papers for the poll on the subject of the Improvement Bill which the Warrington Corporation are promoting this session were distributed last week. They were collected yesterday, and are to be counted to-day. There has been another meeting of the ratepayers—the third—to discuss the provisions of the Bill; and on this occasion, as at the previous meetings, the proposed purchase of the water-works was the main topic of debate. The manufacturers whose rights of taking water for trade purposes from the Mersey were threatened, have issued a circular announcing that they have decided to withdraw their opposition to the Bill. The Corporation have undertaken that the existing arrangement shall not be interfered with.

**The Lancashire Coal Trade.**—Our Bolton correspondent writes: "With the general resumption of work at the various collieries last week, prices of coal fell considerably; and on Saturday the market may be said to have recovered from the effects of the recent strike. Generally speaking, prices were from 6d. to 9d. per ton in advance of those obtainable before the strike; their advance being put on by colliery proprietors to cover the 5 per cent. granted to the men. Quotations for the best coal averaged about 13s. to 14s. at the pit's mouth; engine coal, 8s. 6d. to 9s.; and best slack, 7s. to 8s. 6d. Several of the middlemen are reported to have been badly hit owing to the sudden collapse of the strike; having bought heavily in an advancing market, and being now compelled to sell at a considerable loss to secure a clearance. It was reported on 'Change during last week that one limited coal concern in South-East Lancashire cleared £30,000 out of a mount of coal dirt which had adorned the bank of their principal colliery for years. It was readily bought up for 10s. a ton. Colliery proprietors report a falling off in the demand for export, and for the Midlands for smelting purposes; and in some cases there will be a restriction of the output shortly."

# MISCELLANEOUS NEWS.

## COMMERCIAL GAS COMPANY.

The following is the report of the Directors of this Company, which, with the accounts for the half year ending Dec. 31 last (the principal portions of which are given below), will be presented at the ordinary general meeting of the proprietors to be held on Thursday next :—

The revenue account shows a net profit for the half year of £46,391 10s. 10d.; making, with £1279 13s. 4d. received for interest, £47,671 4s. 2d. This, added to the amount brought forward from previous half years, makes £113,682 4s. 6d. Deducting therefrom £2925 for interest on debenture stock, there remains standing to the credit of the net revenue account a balance of £110,757 4s. 6d., of which, having regard to the sliding scale and the price of gas charged during the half year, £46,500 is available for dividend. The Directors recommend the payment of dividends at the rates of £13 15s. per cent. per annum upon the old stock of the Company, and of £10 15s. per cent. per annum upon the new stock, both less income-tax. The balance of the net revenue, £65,957 4s. 6d., will be carried forward to the next half year.

The Board have to report with deep regret the death of their Chairman, Mr. T. W. Ratcliff. They have elected Sir J. C. R. Colomb, K.C.M.G., M.P., to the seat at the Board thus vacated.

The following Directors—Messrs. J. B. Gill, R. Jones, and F. Farnan—retire by rotation, and, being eligible, offer themselves for re-election. Mr. J. Haigh, one of the Auditors, will also go out of office by rotation, and, being eligible, offers himself for re-election.

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The accounts accompanying the report consist of the usual statements. The statement of capital stock (No. 1) stands as before—£680,000 paid up, out of a total of £830,000 authorized. The statement of loan capital (No. 2) also remains unaltered—£130,000 raised out of £300,000 authorized. The total capital called up at the close of the past year was therefore £810,000—practically the same as on Dec. 31, 1888. The capital account (No. 3) shows a total expenditure of £821,718 0s. 4d., of which £7762 2s. 10d. was spent in the past six months on new works, mains, and services, meters and stoves, and additional land. The expenditure of £821,718 0s. 4d. against receipts amounting to only £810,000 leaves a debit balance of £11,718 0s. 4d. on capital account at the close of the year. The remaining statements are as follows :—

### No. 4.—REVENUE ACCOUNT.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Manufacture of gas— | | | | By Sale of gas— | | | |
| Coals, including dues, carriage, unloading, and trimming (see account No. 8) | | £61,304 17 10 | | Common gas, per meter, at 2s. 4d. per 1000 cubic feet | | £105,478 4 10 | |
| Salaries of Engineers, Superintendents, and other Officers at works | | 2,032 10 0 | | Public lighting and under contracts, common gas (See statement No. 10.) | | 9,012 3 10 | |
| Wages (carbonizing) | | 16,702 18 6 | | | | | £114,490 8 8 |
| Purification, including £1431 9s. 6d. for labour | | 3,378 18 11 | | Meter-rental | | £1,816 14 4 | |
| Repairs and maintenance of plant and works, materials and labour (less £194 5s. 4d. received for old materials) | | 11,393 11 4 | | Stove-rental | | 490 1 5 | |
| | | | £94,815 16 7 | | | | 2,333 15 9 |
| Distribution of gas— | | | | Residual products— | | | |
| Salaries and wages of Officers (including Rental Clerks) | | £2,319 11 8 | | Coke, less £9234 11s. 0d. for labour | | £24,404 8 5 | |
| Repairs, maintenance, and renewals of mains, service-pipes, and fittings, including labour | | 2,241 4 6 | | Breeze, less £299 10s. 7d. for labour | | 689 16 1 | |
| Repairs and renewals of meters and stoves | | 2,280 17 5 | | Tar | | 10,201 1 4 | |
| | | | 6,844 13 9 | Ammoniacal liquor and sulphate | | 9,541 7 7 | |
| Public lamps— | | | | | | | 44,836 13 5 |
| Lighting and repairing | | | 2,207 0 4 | Miscellaneous receipts— | | | |
| Rent, rates, and taxes | | | 4,987 10 0 | Rents | | £133 9 9 | |
| Management— | | | | Transfer fees | | 19 12 6 | |
| Directors' allowance | | £1,250 0 0 | | | | | 153 2 3 |
| Company's Auditors | | 75 0 0 | | | | | |
| Salaries of Secretary, Accountant, and Clerks | | 1,056 19 6 | | | | | |
| Collectors' salaries and commission | | 1,605 12 3 | | | | | |
| Stationery and printing | | 302 10 1 | | | | | |
| General charges | | 370 7 8 | | | | | |
| | | | 4,660 9 6 | | | | |
| Bad debts | | | 911 15 5 | | | | |
| Law and parliamentary charges | | | 35 1 0 | | | | |
| Superannuations | | | 912 2 8 | | | | |
| Official officers | | | 71 0 0 | | | | |
| | | | £115,395 9 3 | | | | |
| Balance carried to profit and loss, net revenue account (No. 5) | | | 46,391 10 10 | | | | |
| | | | £161,787 0 1 | | | | £161,787 0 1 |

### No. 5.—PROFIT AND LOSS (NET REVENUE ACCOUNT).

| | | | |
|---|---|---|---|
| Interest on debenture stock | £2,925 0 0 | Balance, June 30, 1889 | £110,811 0 4 |
| Balance available for dividend, carried to balance-sheet | 110,757 4 6 | Less amount of dividend paid for half year ending June 30, 1889 | 44,800 0 0 |
| | | | £66,011 0 4 |
| | | Balance from revenue account (No. 4) | 43,391 10 10 |
| | | Dividends and interest balance | 1,279 13 4 |
| | £113,682 4 6 | | £113,682 4 6 |

### No. 6.—RESERVE FUND.

| | | | |
|---|---|---|---|
| Balance on Dec. 31, 1889 | £44,379 5 1 | Balance on June 30, 1889 | £44,379 5 1 |
| | £44,379 5 1 | | £44,379 5 1 |

### No. 7.—INSURANCE FUND.

| | | | |
|---|---|---|---|
| Balance on Dec. 31, 1889 | £34,000 0 0 | Balance on June 30, 1889 | £34,000 0 0 |
| | £34,000 0 0 | | £34,000 0 0 |

### No. 8.—STATEMENT OF COALS.

| Description of Coal. | In Store, June 30, 1889. | Received during the Half Year. | Carbonized during the Half Year. | In Store, Dec. 31, 1889. |
|---|---|---|---|---|
| | Tons. | Tons. | Tons. | Tons. |
| Common | 84,770 | 81,188 | 100,086 | 15,872 |
| Cannel | 251 | 4,853 | 3,142 | 1,963 |
| | 85,021 | 86,041 | 103,228 | 17,834 |

### No. 9.—STATEMENT OF RESIDUAL PRODUCTS.

| | In Store, June 30, 1889. | Made during the Half Year. | Used during the Half Year. | Sold during the Half Year. | In Store, Dec. 31, 1889. |
|---|---|---|---|---|---|
| Coke—chaldrons of 36 bushels* | 10,731 | 135,542 | 39,483 | 96,557 | 10,233 |
| Breeze do. do. | 534 | 10,192 | — | 8,907 | 1,819 |
| Tar—gallons | 128,100 | 1,086,123 | — | 783,123 | 431,100 |
| Ammon. liq.—butts of 108 gals. | 3,836 | 35,818 | 32,379 | — | 7,295 |
| Sulphate of Ammonia—tons | 377 | 1,021 | — | 1,295 | 103 |

* Under "Weights and Measures Act, 1878."

### No. 10.—STATEMENT OF GAS MADE, SOLD, ETC.

| Description of Gas. | Quantity Made. Meter Register. | Quantity Sold. Public Lights and under Contracts (estimated). | Quantity Sold. Private Lights (per Meter). | Quantity Sold. Total Quantity Sold. | Quantity used on Works, &c. | Total Quantity accounted for. | Quantity not accounted for. | Number of Public Lights. |
|---|---|---|---|---|---|---|---|---|
| | Thousands. | Thousands. | Thousands. | Thousands. | Thousands. | Thousands. | Thousands. | |
| Common | 1,032,143 | 56,763 | 904,099 | 960,862 | 11,353 | 972,215 | 59,931 | 5,181 |

### BALANCE-SHEET.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| To Capital— | | | | By Balance, per account No. 3 | | | £11,718 0 4 |
| Net Revenue— | | | | Cash at Bankers | | | 14,243 8 9 |
| For balance, per account No. 5 | | £110,757 4 6 | | Cash in hand for current expenditure | | | 2,400 0 0 |
| Reserve Fund— | | | | Amount invested in Consols | | | 78,379 5 1 |
| For balance, per account No. 6 | | 44,379 5 1 | | Stores in hand— | | | |
| Insurance Fund— | | | | Coals | | £11,333 0 0 | |
| For balance, per account No. 7 | | 34,000 0 0 | | Coke and breeze | | 2,900 3 0 | |
| Unclaimed dividends | | 1,900 8 10 | | Ammoniacal liquor and tar | | 7,689 19 8 | |
| Deposits | | 9,214 1 11 | | Sundries | | 5,439 13 2 | |
| Interest on debenture stock | | 164 8 2 | | | | | 27,362 15 10 |
| Sundry tradesmen and others, for amount due for coals, stores, and sundries | | 14,140 19 5 | | Accounts due to the Company— | | | |
| | | | | Gas-rental, quarter ending Dec. 31, 1889 | | £71,378 18 7 | |
| | | | | Arrears outstanding | | 1,305 2 7 | |
| | | | | | | | 72,684 1 2 |
| | | | | For coke and other residual products | | £7,370 3 10 | |
| | | | | Sundries | | 398 12 11 | |
| | | | | | | | 7,768 16 9 |
| | | £214,556 7 11 | | | | | £214,556 7 11 |

## LONDON ELECTRIC SUPPLY CORPORATION, LIMITED.

In our "Electric Lighting Memoranda" to-day we notice the report and accounts of the above Corporation for the past year, which were presented to the shareholders at their annual general meeting yesterday. We give below a few additional particulars.

The accounts, which are made out in the form prescribed for gas companies, comprise a statement of the share capital, the capital, revenue, profit and loss, and reserve fund accounts, and the general balance-sheet. The statement of share capital shows that the total amount is £1,250,000; consisting of £1,000,000 in ordinary £5 shares, authorized by the Articles of Association, and £250,000 in preference shares of like nominal value, sanctioned at a general meeting of shareholders held on Dec. 21, 1888. Of the former sum, £555,000 has been paid up; of the latter, about £100,000 only, being the product of a call of £2 per share. Of the total of £649,750 shown by the capital account to have been received up to the end of last year, £505,258 has been expended. The Deptford works and plant cost £171,071; the mains, £24,137; the Grosvenor Gallery installation of Sir Coutts Lindsay and Co., £249,537; new mains from the Grosvenor station, £20,171; converters, meters, instruments, office furniture, &c., bringing up the total to the sum above mentioned—leaving a balance of £144,492 on capital account. The revenue account is entirely in respect of the Grosvenor station. The principal items are as follows:—

*Receipts.*

| | | | |
|---|---|---|---|
| Sale of current— | | | |
| By meter, at 7½d. per Board of Trade unit | £7,420 | 2 | 6 |
| Under contracts | 18,451 | 4 | 11 |
| Rental of meters, converters, and other apparatus on consumers' premises | 888 | 7 | 1 |
| Sale and repairs of other apparatus | 273 | 6 | 10 |
| Transfer fees and stores | 605 | 3 | 3 |
| Total | £27,638 | 4 | 7 |

*Expenditure.*

| | | | |
|---|---|---|---|
| Generation of electricity— | | | |
| Coal and other fuel | £10,521 | 0 | 10 |
| Oil, waste, &c. | 2,756 | 13 | 0 |
| Proportion of salaries of Engineer, Superintendent, and officers | 300 | 0 | 0 |
| Wages and allowances at generating station | 2,883 | 1 | 8 |
| Repair and maintenance of works and plant | 2,623 | 18 | 3 |
| Distribution of electricity— | | | |
| Proportion of salaries | 320 | 0 | 0 |
| Wages and allowances | 892 | 17 | 11 |
| Repair and removal of mains | 480 | 3 | 11 |
| Do. of transformers, meters, &c., on consumers' premises | 390 | 11 | 6 |
| Rents, rates, and taxes | 1,493 | 18 | 1 |
| Management expenses | 2,510 | 17 | 10 |
| Law and Parliamentary charges | 501 | 1 | 6 |
| Stores | 714 | 5 | 1 |
| Balance (profit) | 1,249 | 15 | 0 |
| | £27,638 | 4 | 7 |

The profit and loss account shows that the profit on the sale of overhead wires, &c., amounted to £3173 3s. 6d.; and interest, &c., to £1003 13s. 9d. These two sums, added to the balance from the revenue account, make a total of £5426 11s. 8d. After allowing for depreciation, writing off bad and doubtful debts, and setting aside £671 10s. 6d. as a reserve fund to meet further allowances on accounts rendered for current, there is left £3546 13s., of which £2628 0s. 8d. will be required to pay the dividend on the preference shares; leaving £920 12s. 4d. to be carried forward.

The Directors begin their report by stating that they have carefully considered the means of turning to better advantage the plant at the Grosvenor station, and have decided to remove it to Deptford. They think it will be obvious to the proprietors that the concentration of the whole of the generating machinery in one establishment, under the control of the Chief Engineer, must secure material advantages in supervision and economy. During the past year the Corporation acquired statutory powers over a large area of the Metropolis, embracing thickly populated and busy districts, from which the Directors believe that a lucrative business may be obtained. They are applying for further powers this session, which, if granted, will considerably enlarge the Corporation's statutory area, and lead to a more economical disposition of the works. The applications for current which are now in hand, and which the Directors state are growing from day to day, justify the expectation that for a long time to come there will be full and profitable employment for the plant. Referring to the accounts (of which a summary is given above), the Directors say they show a balance to the credit of the profit and loss account, from which they recommend that the dividend of 6 per cent. on the preference shares shall be paid. This will allow of a small balance being carried forward. During the past year the Earl of Crawford resigned the chairmanship of the Corporation; but he is continuing his services as Deputy-Chairman. Mr. J. Staats Forbes has been elected Chairman.

Accompanying the Directors' report is one by the Engineer (Mr. S. Z. de Ferranti). In the course thereof he states that during the past year the general works and buildings at the Deptford station have been completed, and a large quantity of machinery for supplying electric current erected. There is now in complete working order plant consisting of two 30,000-light dynamos, with engines, boilers, and other accessories to correspond. In order to utilize this supply of current in London, mains were purchased and laid in the early part of last year, which unfortunately have proved a failure; and owing to this fact only a quarter of the capacity of the Deptford plant can be utilized. Had the mains succeeded, the Corporation would now have been in a position to make use of all the Deptford machinery for the supply of their customers. Referring to the intended removal of the Grosvenor central station to Deptford, the Engineer states that the station was worked during the past year under great difficulty, owing to its position in a populous and busy district. Located at Deptford, it is expected to be able before next autumn to contribute to the supply of light in London more efficiently and economically than it now does. When the removal has taken place, the Corporation will possess plant capable of generating power for 90,000 lights, with which, after making liberal allowances for reserve, they will be able to supply 60,000 lights simultaneously. In addition to this, two large dynamos, each of the capacity of 200,000 lights, are being put up, and are expected to be ready about the end of the year. They will at first be used for only 100,000 lights each; bringing up the productive capacity of the plant to 290,000 lights, of which 160,000 may be supplied simultaneously. At a later stage the current for 200,000 additional lights will be obtained from these machines by merely adding the necessary engine power. The laying of mains has been commenced, and fair progress made in a portion of the Corporation's area. The defective mains now in use are to be shortly replaced by permanent trunk mains, manufactured by the Corporation's own staff; and when this has been done a supply of current to the full capacity of the machinery at Deptford may be utilized. Reference is made to the difficulty experienced in obtaining a satisfactory electric meter; but it is believed the Corporation will before long be able to supply all their customers by measure. The Engineer closes his report by reminding the shareholders that, in erecting their works at Deptford on a site immediately adjacent to the Thames, the Corporation have followed the example of the London Gas Companies; and it is thought that when the Deptford works are further advanced, the wisdom of having done so will be apparent.

## THE ELECTRIC LIGHTING QUESTION IN THE CITY OF LONDON.

A Special Meeting of the Commissioners of Sewers of the City of London was held last Tuesday—Mr. F. Green presiding—to consider a report of the Streets Committee, relative to the proposed contracts with the Brush Electrical Engineering Company and the Laing, Wharton, and Down Construction Syndicate, in regard to the electric lighting of the City. The Committee reported that they had again had under consideration the draft of the proposed contract with the Brush Company, as returned by their Solicitors, with various proposed alterations; and, while deeming it necessary to resist certain of them, they recommended the Court to concur in the following:—That the Company have way-leave in subways for private supply, notwithstanding that the contract for public supply might have been determined; that the private supply be exclusive for 21 years, whether the contract for public supply be determined or not; that, as regarded the remedy of defects found on inspection, the penalty be not enforced if the work of repair be commenced within 24 hours, and be proceeded with diligently to the satisfaction of the engineer; that as regards the sliding scale, 7½ per cent. per annum on the capital sunk in the plant and machinery be allowed for depreciation, and 5 per cent. of the profits available for dividend for a reserve fund until such fund amounts to a quarter of the paid-up capital; and that, though the purchase of the undertaking for public supply at 21 years be under the Act, the purchase of the private supply at 21 years be by agreement or arbitration—the purchase of either at 42 years to be under the terms of the Act. In the event of the Commissioners concurring in those recommendations, the Committee asked authority also to conclude similar terms with the Laing, Wharton, and Down Construction Syndicate for another district. As stated in the Journal last week, the report had previously been before the Commissioners, and had been considered in private.

Mr. J. Cloudsley moved the adoption of the report, and suggested that the discussion should be continued *in camera*.

Several members strongly objected to this; and the suggestion was not adopted.

Mr. Sly, in resuming the discussion, referred to the history of the electric lighting question before the Commission; pointing out that the alteration of their specification for other companies had been refused, and consequently their applications were allowed to lie on the table. Then, on Dec. 3 last, the Brush Company came to them with some modifications of their specification; and they proposed to allow them to have a Provisional Order. Now they had to consider whether the Brush Company should have a further opportunity of altering the arrangement as drawn up by their officers. If the Company had made this proposition at the time, the Commission would not have agreed to it. Supposing the Commission or the Company should think it right to abandon the public supply after seven years, they would be bound to allow the Company to have the exclusive right of private supply for 21 years. They had put this Company in a much better position than the other two Companies who had made application. In the first instance, the Company came and said: "We perfectly agree with your specification;" and then they took up first one point and then another to their own advantage. It was their duty to look after the interests of the public in connection with this matter; and the Brush Company having once agreed to their terms, they should not be allowed to alter them. If the Commissioners agreed to this, the Company would want to make further restrictions on another occasion. He moved that the matter be referred back to the Committee for further consideration.

Mr. Bridgman asked, with reference to the 7½ and the 15 per cent referred to in the report, how much the amount was likely to be.

Mr. Cloudsley said it was impossible to tell; but no doubt the Company would provide plant for the purpose as cheaply as possible.

Mr. Bowring seconded the amendment. He said it seemed to him that for the Commission to hand over the private lighting for 21 years to a Company, when they could give up the public lighting within seven years, would be a monstrous thing. It appeared that the Company were going to do the public lighting at less than cost price; and this would be absolutely offering them a premium to break the contract in some way or another. If they agreed to this, the citizens would be bound hand and foot for 21 years, whatever might be the altered circumstances.

Mr. M'Geagh contended that the term for public lighting should also be that for private lighting; and he advised the Commission to adhere to the terms originally agreed upon.

Mr. A. A. Wood said it was pretty clear that the point to which they took exception was in the second clause of the report—that the private supply should be exclusive for 21 years. To this he was positively opposed, as he believed it would be a gross injustice to the citizens of London. The question was how they could get over the difficulty. It was eminently desirable that they should, without delay, make a contract with some company for the supply of the electric light to the City. If there was much procrastination on their part, the trouble would increase. They want to get rid of the word "exclusive." The fact of there being free competition would enable both the public and private consumers to get the light at a reasonable price.

The Chairman said he thought Mr. Sly was wrong in emphasizing the fact that an absolute arrangement had been made with either of the Companies. He (the Chairman) believed he was right in saying that the Commission had agreed upon a principle; and it was referred to the Solicitor to prepare a contract based thereon. This was really as far as they had gone. On Dec. 3 last year the Streets Committee reported relative to the tenders for electric lighting; and recommended that, inasmuch as the tender of the Anglo-American Brush Electric Light Corporation was in accordance with the specifications based upon the conditions agreed to by the Commissioners, a contract should be entered into with the Company for lighting the central district. The Solicitor was commissioned to prepare a contract, which was submitted to them on Feb. 3 last. The Committee reported on the 18th of that month relative to certain proposed modifications in the contract with the Brush Company; and recommended that the option of renewing the contract for public lighting after the first 21 years should be mutual, but that the proposal to limit the power of purchase to public lighting, and the suggested deduction of interest on the capital, should be resisted, and that the contract should be conditional on the Company obtaining a Provisional Order and all necessary way-leaves. The Commission resolved that the recommendation of the Committee be agreed to; and it was referred to the Solicitor accordingly. This was the position in which they then stood. With regard to the question of extending the exclusive right of private supply for 21 years, they were not altogether free agents in the matter. After all, it was public supply that they had first to direct their attention to; private users would to a large extent look after their own interests. He thought the proposal with regard to capital sunk in plant and machinery a very reasonable one.

Mr. C. T. Harris regarded this as the most extraordinary repudiation of a deliberate agreement with the Commission he had ever known. He said the question was whether, having made an agreement, they should enter into a fresh contract, not favourable to the Commission in one degree, but altogether in favour of the contracting Company. The proposed alterations were not on points of detail, but on matters of principle; and if they agreed to them, they would not be able to continue the public lighting except on the Brush Company's terms. He did not care whether or not the word "exclusive" remained; it was an utterly impossible condition. They would have contracted themselves out of the Act, which was framed for the benefit of the consumers. Five Companies were applying to the Board of Trade for Provisional Orders; and it was the duty of the Commission to oppose every one of them, in order to ensure the insertion of such clauses as were necessary to safeguard the interests they had in charge.

Mr. W. H. Pannell said he thought the Commission were making infinitely better terms than they would obtain under a Provisional Order. A Company was not likely to consent to find the money, and run great risks for the carrying out of a vast experimental enterprise, if they only obtained a seven years' contract. None of the alterations, in his opinion, were inimical to the ratepayers' interests.

Mr. Rogers thought it important for the Commission to consider whether the word "exclusive" should not be omitted.

The amendment was then put, and negatived by 28 votes to 14.

Mr. Pellett then moved, as a further amendment, to leave out the word "exclusive."

Mr. Bowring seconded the amendment; but it was defeated by 23 votes to 17.

The report was therefore adopted.

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**The New Water-Works for Wallasey.**—In connection with the water-works proposed to be constructed at Liscard for improving the supply of Wallasey, tests of the new borehole were carried out last Thursday and Friday week. The trial was made at a depth of 400 feet; and 10,000 gallons of water were pumped. There were indications of a plentiful supply of water; and according to Mr. R. M'Geoch (the Chairman of the Gas and Water Committee), it is of excellent quality. The contract for the work is in the hands of Messrs. Vivian, of Whitehaven; and the estimated cost will be about £2000.

**The Huntingdon and Godmanchester Gas Company's Provisional Order.**—At the commencement of the present year, objection was taken to this Order both by the Town Councils of Huntingdon and Godmanchester, and the ratepayers generally. A town's meeting was held at Huntingdon, and strong protests were made against its various provisions; a resolution being unanimously passed that the same should be opposed *in toto*. On Monday, the 17th ult., arrangements were made for a conference to take place upon the matter at the office of the Board of Trade, Whitehall, between the Secretary of the Board and all interested parties. The Deputy Town Clerk of Huntingdon (Mr. J. P. Maule) opened the proceedings, and pointed out the objections taken by the Corporation to the Order. The Town Clerk of Godmanchester (Mr. G. Hunnybun) asked that his borough might be included in the Order; and it was understood that this would be recommended, but that the maximum charge for the gas consumed in the public lamps at Godmanchester would not be changed from what it at present stands at—viz., £100 per annum. It was believed that the charge to be recommended for the gas used in the public lamps at Huntingdon would be 5s. per 1000 cubic feet. The Clerk to the Gas Company (Mr. E. W. Hunnybun) addressed the Secretary in support of the Order. Some slight alterations were made; and on the whole it appeared that the Godmanchester Corporation obtained what they asked for, whilst the Huntingdon Corporation were not conceded what they required.

## PROVINCIAL GAS AND WATER COMPANIES.

From the accounts or reports of meetings of the various Gas and Water Companies mentioned, we have extracted the particulars contained in the following paragraphs in regard to their working during the periods referred to.

### Gas Companies.

The proprietors of the Alliance and Dublin Consumers' Gas Company held their half-yearly meeting yesterday. The report which was submitted on the working during the half year to Dec. 31 last was almost entirely devoted to a recital of the labour difficulties which the Directors and the Secretary and Manager (Mr. W. F. Cotton) had had to combat with in connection with the general agitation among gas workmen throughout the kingdom. The stokers and some of the other men employed by the Company memorialized the Board for shorter hours and increased wages. Several interviews took place between the Directors and the representatives of the men; the result being that, after lengthened negotiations, it was arranged to adopt the eight-hour shift, and also to advance the wages of certain of the men. The disorganization produced by the excitement through the men making preparations for a strike, led to great neglect in the working of the retort-houses. From this cause, the temperature of the retorts was often allowed to run down, so as to materially diminish the make, and to reduce the stock of gas; and to such an extent was this system carried out, that the supply of gas could not be maintained at the ordinary pressure. This state of things lasted for some time before the men formulated their demands; and during the interval the Company suffered great inconvenience and serious loss, a large portion of which, the report pointed out, would affect the present half year. The alteration from a twelve to an eight hour shift involved the employment of about 50 per cent. additional hands. As a set-off against this concession, the men promised that, under the new system, they would do better work; and the Directors were pleased to be able to state that for some time back the work had somewhat improved, although it had not yet reached its normal condition. The increased expenditure for labour in the carbonizing department, amounting to about 50 per cent., added to a considerable advance in nearly every article used in the manufacture of gas—notably, in cannel, which has advanced 9s. or 10s. per ton during the past twelve months—the Directors stated had compelled them to increase the price of gas 3d. per 1000 cubic feet. The accounts annexed to the report showed that the total income had amounted to £121,051, of which gas produced £95,754; meter-rents, £2871; coke, £12,429; breeze, £211; tar, £5831; ammoniacal liquor and sulphate of ammonia, £3701; rents, £187; and transfer fees, £64. The total expenditure was £86,041, of which £67,268 was spent in manufacturing operations. Of the last-named amount, coal was responsible for £33,324, and cannel for the large sum of £15,379—together £48,704. The distribution of gas cost £6705; and the outlay on lighting and repairing public lamps was £735. The rents, rates, and taxes amounted to £4678; and the disbursements under the head of management were £4379. Some minor items brought up the total expenditure to the before-mentioned amount of £86,041. Deducting this from the receipts, a balance remained of £35,010 to be carried to the credit of profit and loss account. The interest on loan capital (£5070) being taken from this, and the interest on investments, &c., added to it, left the net profits for the half year at £31,211. This sum, together with the balance brought from the last account (£36) made £31,247. The Directors recommended the payment of dividends at the rate of 10½ and 7½ per cent. per annum, on the respective shares, payment of which involved the withdrawal from the reserve fund of £3477. The expenses incurred by the Company in the recent arbitration with the Corporation were charged to the contingent fund, and amounted to £1526. A report of the proceedings at the meeting of the proprietors will be published in next week's Journal.

The annual general meeting of the Armagh Gas Company was held on the 17th ult.—Mr. J. S. Riggs in the chair. The Secretary (Mr. J. G. Deacon) read the Directors' report, which stated that, in face of an increase in the price of coal, the results of the Company's operations had been satisfactory, from the fact that there had been a substantial augmentation of the consumption of gas and coke. The usual dividend at the rate of 2s. per share, free of income-tax, was recommended. He next read the report of the Engineer and Manager (Mr. J. Whimster), in the course of which it was stated that the increase in the consumption of gas had been at the rate of about 5 per cent. The works had been kept in the usual state of repair; but some extra expenditure would have to be incurred this year. The Chairman, in moving the adoption of the report, alluded to the steady advance in the Company's business; and said that if the coal market were in a more settled condition, they could look forward to the current year being still more successful. Unfortunately, however, the state of the coal trade was such as to render any forecast impossible. The Directors were proud at having been able to reduce the price of gas to the figure at which it had stood for some years, and would feel reluctant to raise it again. They hoped that, by keeping the price of gas low while the price of coal was high, they might induce more of their customers to use gas-stoves; for if some found it to their advantage, when coals were cheap, to adopt gas as fuel, it should be much more advantageous when coals were dear, if the gas remained cheap. The Directors had been doing what they could to encourage the Town Commissioners to improve the lighting of the city by giving subscriptions towards the erection of large lamps; and they had reason to congratulate both the Commissioners and themselves that the town was gradually putting on a better appearance at night, and that the annual cost for lighting was still very moderate. Mr. Prentice seconded the motion, and it was carried unanimously. The dividend recommended was then declared; and the retiring Directors and Auditor were re-elected. The thanks of the meeting were accorded to the Directors for their services, and also to Mr. Whimster for his attention to the Company's interests.

In moving the adoption of the Directors' report for the year ending Dec. 31 last, at the annual meeting of the Torquay Gas Company yesterday week, the Chairman (Mr. W. H. Kitson, J.P.) said that, all things considered, the accounts were very satisfactory; but there were

certain items in them which they would have been glad to have seen absent. Notwithstanding the last reduction in price, they had had a decrease in the amount of gas consumed of about 2 per cent.; the cost of materials had risen enormously; and they had made concessions to their workmen which involved an extra expenditure of £500. The total receipts for the year were £21,000, as against £22,100 for the previous year; the profit balance being £7712, as compared with £7998, or about £200 less. In regard to the capital account, they had received since last May by the sale of shares £2500, and a premium of £1000; the latter being considerably more in proportion than when the last sale of shares took place in 1884. This indicated that the position of gas companies was certainly better than it was six years ago, notwithstanding the effect which the electric light might have on their success. The sale of gas realized £16,614; and that of residual products £3417, as against £2918. The hire of cooking-stoves did not seem to make as much progress as they would like to see. Speaking, in conclusion, on a subject upon which there existed some difference of opinion, he said that personally he saw no reason why, if the cost of coal, labour, and iron remained so large, and was likely to increase, the price of gas should not be advanced in proportion. Mr. H. Willey, in seconding the motion, said he expected the Directors would have found it necessary to increase the price of gas, and had they done so, they would have had every justification, and would only have followed the example of other towns. The Company supplied gas cheap and good; for in point of quality it bore favourable comparison with that of any other town in the West of England. The motion was carried; and subsequently a resolution was passed declaring the dividends recommended by the Directors, and which made, with the interim payment, 10 and 7 per cent. on the preference and ordinary shares. The services of the Directors and the Manager (Mr. R. Beynon) were also acknowledged in suitable terms by the shareholders.

**Water Companies.**

The annual meeting of the Bristol Water-Works Company was held last Saturday week. In moving the adoption of the Directors' report for the past year, the Chairman (Mr. E. Bush) stated that there had been an increase in the revenue of £3921, which was very large indeed. The average increase of the past ten years was £2065; so that this latest increase was nearly double the average, and would show the need for the Company looking ahead and getting a plentiful supply of water for the city. In 1889, 1221 houses were connected with the Company's mains, as against the average of 946 during the past ten years. This year the number would be still greater, judging by the rate at which they were going on. The Company's last Act of Parliament had given them very great powers. Their additional supply, when the Yeo Valley scheme was completed, would be at least 5 million gallons per day. They would construct a reservoir to contain between 1700 million and 1800 million gallons of water. The reservoir would be 1¾ miles long; and the 5 million gallons would be in addition to the compensation to be given. As to the works at Barrow, they had, as he stated last year, had a serious slip there, and they were now making the banks flatter, on the advice of Mr. T. Hawksley—not so steep as was originally intended. The reservoir would be utilized this year; and they would soon be able to use the filter-beds. Mr. S. Jones seconded the motion, which was unanimously agreed to.

The report and accounts for the half year ending Dec. 31 presented at the meeting, last Saturday week, of the shareholders of the West Gloucestershire Water Company, showed a profit of £300 18s., which, with the previous balance, made the sum of £571 10s. to the credit of revenue account. Between the date of the return made up to March 23, 1889, and the return for the current year made up to the 8th ult., 658 additional services had been laid on; making the total number of houses supplied by the Company on the last-mentioned date 1655, the water revenue from which, including some supplied by meter, was estimated to produce £1283 per annum, being an increase in the annual revenue between the dates named of £505. The above figures show that the increase in the revenue from water supplied had been between 60 and 70 per cent. during the period named; and this revenue was derived from only about one-eighth of the total number of houses in the Company's district. The report and accounts were adopted on the motion of the Chairman, Mr. E. Horton.

## HARROW DISTRICT GAS COMPANY.

The Half-Yearly Meeting of this Company was held yesterday week, at Winchester House, Old Broad Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

The ENGINEER and SECRETARY (Mr. James L. Chapman, Assoc. M. Inst. C.E.) having read the notice convening the meeting, it was agreed to take as read the Directors' report and the accounts for the half year ending Dec. 31 last.

The CHAIRMAN first remarked upon the meeting being held on this occasion in London; and he stated that he believed the Board would arrange to meet the shareholders alternately at Harrow and in the City. Proceeding to comment upon the report, he observed that it mentioned that there had been an increase in the consumption of gas. During the past half year 15,520,000 cubic feet were sold; while in the corresponding six months of 1888, the figure stood at 14,757,000 feet. This was an increase of 763,000 feet, or about 5 per cent. He thought a good part of this increase was normal, though it was possible the reduction in price had stimulated it a little. A concession to the consumers of 3d. per 1000 cubic feet represented something like £180 upon the amount of gas sold in the half year; and in a small Company like theirs, this was a serious thing to contend with. Compared with the second half of 1888, there was very little variation in the items on the expenditure side of the revenue account; but he might mention that the rates and taxes for the past half year amounted to £197; while in the last six months of the preceding year they were £144—being an increase of £53. This was partly due to increased rates and higher assessments. He had not the slightest objection to pay his fair share of rates and taxes; but it seemed to him that some people regarded gas companies as nothing but sponges to squeeze, out of which they should get as much as possible. On the opposite side of the account, coke, tar, and sulphate of ammonia showed an aggregate increase of £61; but the sum received for gas was about the same. The amount of profit was £1582, as against £1578 in the second half of 1888; so that, in consequence of the increased consumption of 763,000 cubic feet, and the improvement in the receipts for residuals, notwithstanding the reduction of 3d., the profit was about £4 more. The plant was all in a sound condition; and the unaccounted-for gas was only 4·9 per cent. He thought the balance-sheet would be regarded as satisfactory by the shareholders—peculiarly satisfactory if they considered the anxieties of the half year. Although the men had borne a kindly feeling towards their masters, yet the Directors had been aware that they had been in an unsettled state; and they were highly indebted to their Engineer for the admirable tact he had displayed in managing them. Having alluded to the recent troubles in the colliery districts, the Chairman concluded by moving the adoption of the report and accounts.

Mr. JOHN CHAPMAN, in seconding the motion, mentioned that there was a possibility of another railway coming into their district, and they were applying for land only about 50 yards from the gas-works. If this scheme was carried out, the Company would effect a great saving in the cost of the carriage of materials to the works. He also spoke of the development of the district; and said he believed that in the future they would sell more gas than they had ever done in the past.

The motion was unanimously carried.

Dividends were next declared, at the rate of 7½ per cent. per annum, on the original "A" capital, of 7 per cent. on the "B" capital, and of 5¼ per cent. on the "C" capital, all less income-tax.

On the motion of Mr. CHARLES HORSLEY, J.P., seconded by Mr. A. G. HOUNSHAM, the Chairman, who retired from the Board, was re-elected, as was also Mr. John Chapman, who likewise retired, on the proposition of the CHAIRMAN, seconded by Mr. JAMES RANDALL.

The retiring Auditor (Mr. Fenton) was next re-appointed, on the motion of Dr. J. W. L. GLAISHER, seconded by Mr. MAGNUS OHREN.

Mr. HORSLEY, in proposing a vote of thanks to the Engineer and Secretary, referred to the recent agitation among the men employed at gas-works, and said the small companies were greatly indebted to the large ones for the way in which they had stood out against the demands of the men. If the men could have had their own way, the Harrow Company would not have been in its present position. With regard to the price of coal, he stated that they would find it had gone up 1s. since they made their current contract; the men having had 30 per cent. increase in wages. The reason why coal would continue to rise was this—that when the colliers obtained such high wages, they worked one day a week less; and the consequence was the colliery owners had to put up the price of coal, through their machinery standing idle.

Mr. OHREN seconded the motion, which was heartily agreed to.

The ENGINEER and SECRETARY having suitably acknowledged the continued confidence of the shareholders,

Mr. CHARLES GANDON proposed, and Mr. W. H. H. BROADBERRY seconded, a vote of thanks to the Chairman and Directors.

The CHAIRMAN briefly responded, and the meeting terminated.

## OTTOMAN GAS COMPANY, LIMITED.

The Ordinary Meeting of this Company was held last Tuesday, at the London Offices, No. 9, Queen Street Place, E.C.—Mr. EDWARD HORNER in the chair.

The notice convening the meeting having been read,

The CHAIRMAN moved the adoption of the Directors' report and the accounts for the half year ending Dec. 31 last (see *ante*, p. 557). In doing so, he said the working had been satisfactory during the six months. The average production of gas per ton of coal was 10,568 cubic feet; the leakage being only 8·34 per cent. The net profit was £511 17s. more than for the corresponding half year, admitting of a dividend of 7 per cent. being paid on the ordinary shares, and the addition of £500 to the reserve fund.

Mr. A. J. DOVE seconded the motion, which was unanimously carried.

On the motion of the CHAIRMAN, seconded by Mr. DOVE, a dividend at the rate of 7 per cent. per annum, free of income-tax, was declared.

The CHAIRMAN moved that Mr. Stephenson Clarke, who retired, be re-elected a Director; remarking that a gentleman holding such a high position was a good man to have on the directorate of a company.

Mr. W. H. HARDY seconded the motion, which was unanimously carried.

On the proposition of Mr. C. NEWTON, seconded by Mr. MAGNUS OHREN, the Auditors (Messrs. C. K. Butt and T. Guyatt) were re-appointed.

The CHAIRMAN, in proposing a vote of thanks to the Engineer and Manager (Mr. H. W. Andrews), the Secretary (Mr. A. J. King), and the staff, said that Mr. King, who had done so much for the Company during his connection with it, was unfortunately unable to be present through illness.

Dr. FRANCIS seconded the motion, which was unanimously carried.

Mr. MAGNUS OHREN remarked that they must not forget their Board of Directors; and it was his pleasure to move a vote of thanks to them. He was sure the shareholders absent, as well as those present, would be glad to read in the JOURNAL OF GAS LIGHTING, the Chairman's remarks respecting the position of the Company, and his assurance that everything was going on satisfactorily.

Mr. HORATIO BROTHERS seconded the motion, which was heartily concurred in by the shareholders.

The CHAIRMAN briefly responded; and the proceedings terminated.

**An Exhibition of Gas Appliances at Belfast.**—An exhibition of gas appliances is now being held at the gas-works of the Belfast Corporation. Mr. James Stelfox, the Engineer, presided at the opening ceremony last Tuesday, and introduced to an audience consisting chiefly of ladies Miss H. M. Young, of Warrington, who had been engaged to deliver lectures on the advantage of cooking by gas during the course of the exhibition, which, according to present arrangements, will close on Thursday.

## SMETHWICK LOCAL BOARD GAS SUPPLY.

The annual report and statement of accounts in connection with the gas undertaking of the Smethwick Local Board for the year ending Dec. 31, 1889, has been presented. It shows that the total amount borrowed up to the close of last year was £162,089; the amount authorized being £182,709. The total amount expended up to that date was £161,947. The cost of the gas manufacture was £11,698 9s. 6d.; while the expenses of distribution, management, &c., brought up the total expenditure to £14,185 1s. The income from the sale of gas, including public lighting, was £18,035 9s. 7d.; the residual products realized £6593 17s. 9d.; and the fittings, £83 3s. 11d.—making the aggregate income £24,712 11s. 3d. The gross profit was £10,527 10s. 3d. The total quantity of gas sold was 137,118,600 cubic feet, as compared with 131,535,800 cubic feet last year; showing an increase at the rate of 4½ per cent. After making allowances for the payment of interest on loans and instalments of loans, there remained a balance of £2823 13s. 1d., being the net profit for the year. At the meeting of the Board on the 21st ult., Mr. Brookes moved the adoption of the report, and congratulated the Board on the satisfactory result of the year's operations in the Gas Department. He said the amount of profit made was, with one exception, the largest realized in one year since the establishment of the works (which are under the management of Mr. B. W. Smith); and it was the result of the great increase in the consumption of gas and the improved value of residual products. He hoped that next year the undertaking would yield a larger profit; but he thought this was doubtful, as they had to pay more for wages, in consequence of the re-arrangement of the shifts to reduce the number of the working hours for the men, and also on account of the advance in the price of coal. The report was adopted.

**Sales of Shares.**—Some consolidated stock of the *Maidstone Gas Company* has just been sold by auction. The first five lots of £100 fetched £222 each; the next lot of £50, £111; and the last six lots of £25, £55, £55 10s., £56, and £56 10s. respectively.——About 50 shares of £5 each, in the *Chatham Water-Works Company* have just been sold at from £15 to £15 12s. 6d. each. Five shares on which £4 each was paid have changed hands at £10 10s. per share.

**The Water Supply of Cambridge.**—In order to meet the difficulties that arise in regard to the supply of water to houses within the borough of Cambridge in those localities in which the mains of the Water Company have not at present been extended, the Town Council have decided to make application to the Local Government Board under section 11 of the Public Health (Water) Act, 1878, to invest the Council as the Urban Sanitary Authority with the powers and duties given to Rural Sanitary Authorities under that Act.

**Water Supply in Relation to Sanitary Inspection.**—A paper on this subject was read by Mr. J. Parry, the Water Engineer of the Liverpool Corporation, at a meeting of the North-Western District Branch of the Association of Public Sanitary Inspectors of Great Britain, held in Liverpool, last Saturday week. The author dealt with the question of water supply in a comprehensive manner, and gave many valuable practical hints concerning the inspector's work. Referring to the danger of water being rendered poisonous by passing through leaden pipes, he said that he had taken several samples from taps in Liverpool, which, on analysis, were found in every case to be free from lead. As to the demand for a storeage cistern for every house, to be drawn upon in case the supply from the public mains was withdrawn, he pointed out the sanitary disadvantage of these cisterns being liable to pollution and becoming foul. He urged that the sanitary and water departments should work more harmoniously together.

**The Leicester Corporation Water Bill.**—This Bill, one of the principal objects of which was to give the promoters power to construct an extensive reservoir for storeage purposes, was before the Select Committee of the House of Lords presided over by Lord Poltimore, on the 13th, 14th, 17th, and 19th ult. Mr. Bidder, Q.C., Mr. Pembroke Stephens, Q.C., and Mr. Toller were counsel for the promoters; and the Earl of Lanesborough, who petitioned against the Bill, was represented by Mr. Pember, Q.C., and Mr. Lawrence. From the opening statement of Mr. Bidder, it appeared that his Lordship regarded the site proposed to be taken by the Leicester Corporation on which to construct the reservoir as the most attractive part of his estate. But the learned Council contended that, as the mansion was a quarter of a mile from the nearest point of the reservoir, and as the reservoir would form a lake of water 175 acres in extent, it would add to, rather than detract from, the beauty of the estate. A great deal of evidence was given on behalf of his Lordship; one of the principal witnesses being Mr. G. F. Deacon, C.E., of Liverpool. He deposed that he had seen the site of the reservoir, which, on account of its shallowness, would be unique. When in full working operation, 49 acres of the surface would be exposed every summer, at the whole depth of 10 feet. Usually reservoirs were much deeper in proportion to their size than this; and its proximity to Lord Lanesborough's mansion would be objectionable and insanitary. In cross-examination, he said he believed the Leicester people had been looking forward to this reservoir for a long time. Reservoirs were not drawn down so much at first as subsequently; but Lord Lanesborough would have no power whatever, under this Bill, as to the working of this particular one. His (Mr. Deacon's) suggestion was that dams should be put in on each side of what was known as the Brazil Island; and the 49 acres be made a permanent lake, liable only to a rise and fall of 2 feet. In the result, the Committee expressed their opinion that the Bill should be allowed to proceed, provided dams were constructed as suggested, and words added to clause 10 providing for a continuity of the work when once begun.——At the quarterly meeting of the Leicester Town Council last Tuesday, the Water Committee presented an exhaustive report on the Bill, showing the various modifications which had been made in certain clauses. Alderman Wood, in moving the adoption of the report, said the Corporation would, when the Bill was passed, have something like 12,000 acres as a gathering-ground for water; so that they might look forward to many years in which they would have no anxiety as to a water famine. The motion was unanimously adopted.

## NOTES FROM SCOTLAND.

**From our Edinburgh Correspondent.**

EDINBURGH, *Saturday*.

It is probable that my Note of last week did not bring out with sufficient clearness the position of matters in the Leith Town Council with reference to electric lighting, because the incident did not appear to me so serious as it has since turned out to be. Bailie Archibald challenged the accuracy of a minute of a Committee meeting, in which a motion was put in his name, in favour of the Gas Commission being constituted the Local Authority for electric lighting. He maintained that he did not move to that effect in Committee, for the reason that the meeting was not regular, one member not having been summoned to it. The minute stated that the motion was lost; and he moved at the Council meeting on 18th inst., that the minute be held as inaccurate, but the Council rejected his motion by eight votes to seven. Thereafter he moved the motion in the Council which I gave last week; and it was also lost on a division. The Bailie has therefore considered it to be his duty to retire from the Gas Commission; and he has accordingly sent his resignation to the Clerk to the Gas Commissioners and to the Town Clerk of Leith. It is a pity that Bailie Archibald's valuable services should be lost to the Gas Commissioners, particularly so on a personal ground, and that, too, when he was without doubt correct. The affair probably arose through a misunderstanding; but whether it did so or not, the word of a respected member like Bailie Archibald ought to have been taken when he explained that a motion had been put in his name which he did not move. At the same time it is difficult to see why the Gas Commission should lose his services for that reason. It was the Town Council who refused his explanation; and he might more appropriately have resigned his seat in the Council than at the Gas Commission, with whom he has had no quarrel.

At the Railway Rates enquiry in Edinburgh, evidence was given on Monday with reference to the charges for carrying coal to the Edinburgh and Leith Gas-Works, in support of the Commissioners' objections to the schedule of the railway companies. Mr. F. T. C. Linton, the Engineer and Manager of the Leith Gas-Works, said he thought the maximum rates proposed were excessive; and that 10 per cent. above the present rates would be a reasonable margin to fix as the maximum. The charge for terminals he also thought unreasonable, because in the Leith works they loaded and unloaded the waggons themselves. They also arranged the trains; and all the railway company did was to provide the haulage. The terminal charge proposed was at the rate of 8d. per ton. At present they paid £4963 a year for carriages in connection with the Leith works. If the maximum rates proposed were charged, the addition would be £1743 per annum; and if terminal charges were exacted, they would amount to £4119. He did not think it fair that the Gas Commission should be required to furnish their own waggons for the conveyance of lime. Hitherto the railway companies provided waggons for this purpose, and the system worked perfectly well. Mr. R. Mitchell, the Engineer of the Edinburgh Gas-Works, concurred with Mr. Linton's opinions; and stated that every year the railway companies brought into their works 87,037 tons of coal, the cost of conveying which was £11,832. If the proposed maximum rates were charged, the addition would be £4067; and if terminal charges were imposed, they would amount to £5077, an increase altogether of £9117. Counsel for the Gas Commissioners offered to draft a clause dealing with the carriage of lime for the gas-works; and the Counsel for the railway companies undertook that an agreement on that point would be come to before the Provisional Order was presented to Parliament.

There has been this week a slight movement in the electric lighting world in Scotland, consequent on the presence in this quarter of Lord Balfour of Burleigh and Mr. Courtenay Boyle, representing the Board of Trade. These gentlemen on Tuesday received representatives of the Corporation of Edinburgh, of the Scottish Electric Supply Company, and the Scottish House-to-House Electricity Company, and on Wednesday representatives of the Leith Town Council, on the subject of electric lighting, while the latter body also discussed the same subject on Thursday. The outcome of the conference with the Edinburgh Corporation was an expression of opinion that the Corporation should be recognized as the Local Authority, with option of delegating their powers; and that of the conference with the representatives of the electric lighting companies, that an opportunity should first be given to the Corporation to show whether they mean to take any steps in the matter themselves. For this purpose, though a public inquiry into the circumstances was asked on behalf of the House-to-House Company, action in that direction was virtually postponed for a year. In this connection it may be noticed that Mr. Courtenay Boyle demolished one of the leading props upon which electric lighting companies have been resting their claims—viz., that Major Marindin had reported to the Board of Trade that the withholding of consent by a local authority should not stand in the way of applying companies. That clause in Major Marindin's report having been cited, Mr. Boyle pointed out that it was contained in a report to the Board of Trade, but that the Board had never adopted that line of action; although, in special cases in London, it had been found necessary to dispense with consent. In the case of Edinburgh, both Lord Balfour and Mr. Boyle were very strongly of opinion that the consent of the Town Council should not be dispensed with. As consent is refused, the electric companies were obliged to fall back upon the plea that their living in the field this season should be a reason for not subjecting them next year to competition by companies who have not yet come forward. This view Lord Balfour and Mr. Boyle thought reasonable; and the Corporation undertook to look upon the matter in that light. The Leith Corporation asked that in whatever arrangements were made for Edinburgh, Leith should be included, because the two communities are at present united in the gas supply. The areas proposed at present, it was pointed out, did not contain any Leith streets. The Corporation, however, were willing to undertake the duties laid upon them by the Statute whenever they saw any reasonable desire for electric lighting.

The Works Committee of Dundee Water Commissioners had before them yesterday the question of increasing the carrying power of their water-mains to Dundee. A duplicate pipe, which has given much

satisfaction, was laid for part of the way last year; but the consumption has gone up so much of late that it is looked upon as a necessity in the near future, that the new line of piping should be continued on to Dundee. A committee has been appointed to consider the matter

**From our Glasgow Correspondent.**

GLASGOW, *Saturday*.

Some further progress has been made this week towards making selection of a successor to Mr. D. Terrace as Engineer and Manager at the Glasgow Corporation Gas-Works, Dawsholm. It seems that there were thirty-five applicants for the appointment. The Conveners of the Sub-Committee selected half-a-dozen of the most likely men; and in the early part of this week, at a special meeting of the Works Sub-Committee, the number was still further reduced to three candidates. These all hail from English Gas-Works—the Nine Elms station of The Gaslight and Coke Company, and the Sheffield and Liverpool Gas-Works. I am told that in all cases these candidates are Scotchmen. All the three candidates have visited Glasgow and had interviews with the Special Sub-Committee. I am informed that the candidate who is "first favourite in the running" is Mr. Alex. Wilson, of the Nine Elms Gas-Works; and it is not unlikely that he will be recommended to the Town Council, sitting as Gas Commissioners, next Thursday, when the appointment will in all probability be made by the selection of the Sub-Committee being confirmed. I should mention that Mr. Terrace has lately been permitted to divide his time between the Dawsholm works and the works at Middlesbrough, over which he will very soon have complete charge.

It is stated that the stokers employed at Inchgreen Gas-Works, Greenock, are not satisfied with the increase of wages that was recently conceded to them by the Police Board (who are the Gas Commissioners of the Burgh); and that they have renewed their demand for a working day of eight hours and a still further increase of wages. A visit has been paid to Glasgow this week by a deputation from the Greenock Corporation Gas Committee, with the object of ascertaining the nature of the latest improvements introduced in the manufacture of gas, as well as to learn the system of working that prevails in the several large gas-works.

Referring to the gas consumption statistics given in my "Notes" last week, I may state that, on behalf of the Directors of the Partick, Hillhead, and Maryhill Gas Company, a little census has recently been taken of all the gas cooking-stoves, gas-fires, gas-engines, &c., within the Company's area of supply, which is occupied almost exclusively by a residential population. The result is, I am informed, that somewhere about 1400 gas-consuming appliances for other than lighting purposes have been fixed in their district within the past five years. This interesting fact affords an explanation as to where the increased consumption of gas is going.

The year's revenue for gas supplied by the Glasgow Gas Commissioners up till a few days ago was almost, but still within, £210,000, whereas over the same period of the last financial year it was upwards of £215,200. This large decrease is due, of course, to the fact of the price of the gas having been reduced 2d. per 1000 cubic feet at the beginning of the present financial year. Already some of the Gas Commissioners are wondering if it will be necessary to increase the price of gas next year in consequence of the much greater outlay in the current year for stokers' and other workmen's wages, together with some increase in the cost of the coal which has been contracted for. It is satisfactory to know, however, that a considerable portion of the decrease in revenue from sales of gas and increased expenditure under the two heads just mentioned will be neutralized or met by a very large increase which is being made in the revenue from sales of secondary products. In this connection, I may also mention in passing that the sales of coke are in a very satisfactory state; indeed, it is said that there is practically none in stock, which circumstance has warranted the Works Sub-Committee in making an increase in the price of the commodity this week to the extent of 1s. per ton.

The Glasgow pig iron market has been flat this week, with a marked absence of speculative business, and in consequence the price of Scotch warrants has dropped about 1s. 9d. per ton. On account of the heavy demand for shipments, and for local wants, the stocks are decreasing all round. This week's reduction is again more than 10,000 tons. The closing price yesterday was down to 49s. 10½d. per ton cash sellers.

There has been a less satisfactory week in the local coal trade, as the extra push to meet demands from England has gone off. In some instances prices have become decidedly easier; even 6d. per ton has here and there been abated by sellers.

## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March 29*.

**Sulphate of Ammonia.**—The better demand which seemed making an appearance last week has proved to be from dealers to cover orders already contracted for; but the Continent seems so far to have made but little advance. The sales have been on a fair scale; and as the wants were urgent, had makers but stood firm, good prices would have been obtainable; but some hesitation being shown, lower rates have resulted. The business for delivery f.o.b. Hull has been at £11 16s. 3d. to £11 15s.; but the greatest weakness has been in the Leith market, where £11 13s. 9d. down to £11 12s. 6d. has been accepted. The position of nitrate of soda might create some uneasiness as to the future of sulphate; but it has so frequently happened that these two commodities do not run in the same groove, that it will not be matter of very great surprise if such be the case at the present juncture. Cargoes off coast bring 7s. 10½d.; the price on spot is quoted 8s. to 8s. 1½d.

**Rochdale Corporation Gas Supply.**—At the Rochdale Corporation Gas-Works, the make of gas in the year which ended on the 25th ult. was 353,072,000 cubic feet. This is 21,332,000 cubic feet more than in the preceding year. The Gas Committee have decided to ascertain the cost of putting in new retorts on Coze's system, and also of applying a new method of purification.

**The Anglo-Romano Gas Company** have just declared dividends of £2 4s. per share on the fully-paid shares, and 7s. 6d. per share on the new shares of 1888.

**Increase in the Price of Gas at Belper.**—In consequence of the enormous rise in the cost of coal, the Directors of the Belper Gas Company have given notice that the price of gas will be advanced from 3s. to 3s. 6d. per 1000 cubic feet as from to-day.

**Stainland Water Supply.**—Respecting the application of the Stainland Local Board for permission to carry out their Coldacre water-works scheme, it is understood that the Local Government Board have replied that they will raise no further objection to a loan being recommended so long as the Board are willing to take upon themselves the entire responsibility of the project.

**The Public Lighting of Barnsley.**—The minutes presented by the Park and Lighting Committee, at the meeting of the Barnsley Town Council last Tuesday, stated that the Borough Surveyor had been authorized to apply to six electric lighting companies for tenders for supplying plant requisite for the Corporation to light the inner area mentioned in their Provisional Order with the electric light; and also recommended that the Town Clerk apply to the Gas Company to know upon what terms they would renew the contract for the lighting of the public lamps after June 30. The minutes were passed without discussion.

**An Unfortunate Accident at the Coventry Corporation Gas-Works.**—Last Thursday week, the city of Coventry was suddenly thrown into darkness. According to a statement made by Mr. Andrews, at the meeting of the City Council last Tuesday, the mishap arose by one of the gasholders in descending having stuck fast. There was, he said, no negligence on the part of anybody at the works; and the only suggestion that could be made to account for the accident was that some of the contractor's men engaged near the holder during the last month or two, had probably let something fall into the tank which held the holder fast. He also added that the Gas Committee had given their sanction for the construction of an automatic apparatus, with a view to preventing similar accidents in future, the expense of which would be £80 or £90.

**New Joint-Stock Companies.**—The Haswell Gaslight and Coke Company, Limited, has been registered by Messrs. R. and J. Dempster, Gresham House, E.C., with a capital of £5000, in £1 shares, to purchase the gas-works at Haswell from Mr. T. Bower, of West Hartlepool, and Mr. Robert Dempster, of Manchester. The Electric Meter Company, Limited, has been registered with a capital of £50,000, in £10 shares, to enter into an agreement providing for the sale to the Company of certain letters patent relating to electric meters and other rights, and to carry on business as electricians, mechanical engineers, and manufacturers of electrical apparatus and appliances. The Anglo-Californian Petroleum Company, Limited, has been registered with a capital of £250,000, divided into 150,000 preferred shares of £1 each and 100,000 deferred shares of £1 each, to acquire and develop the land, petroleum wells, and the plant and materials connected therewith, belonging to Messrs. Lacy and Rowland, situate in the county of Los Angeles, California, and the business of petroleum producers and dealers, now carried on in that county by them under the style of the Puente Oil Company.

**Lecture on Coal Gas.**—At the last meeting of the Bradford Scientific Association, Mr. Charles Wood, F.C.S., of the Gas Department of the Bradford Corporation, gave a lecture on "Coal Gas." He traced the illuminant from its earliest recorded applications down to the times of Murdoch and Winsor; and then went on to instance the first attempt to employ it for public street lighting. Mr. Wood subsequently explained the manufacture of gas, and described its composition—showing some specimens of the different gases of which it is composed. With regard to the various kinds of burners, he stated that in Bradford at least one-third of the lighting power of the gas was wasted owing to defective burners. Mr. Wood observed, in conclusion, that every week brought some fresh application of one or other of the coal products—among the more recent discoveries being those of antipyrin and antifebrin, now of immense medicinal importance; while picric acid, employed for dyeing purposes, had quite recently obtained a new value on account of its forming an important ingredient of smokeless gunpowder. A hearty vote of thanks was awarded to Mr. Wood for his lecture.

**The London County Council and the Water Companies' Charges.**—At the meeting of the London County Council last Tuesday, Mr. J. Beal, Chairman of the Special Committee on Water Supply and Markets, reported that, in pursuance of the following resolution, passed by the Council on Feb. 11 last—"That, in view of the quinquennial reassessment of property in London, which will come into force next year (1891), and the resulting effect which will give the Water Companies power to exact an increased charge for their supply, this Council instructs its Special Water Committee to immediately take the question into consideration and report thereon"—they had given careful consideration to the subject of the reference, and submitted the following recommendation:—"That the Council do introduce into Parliament during the present session a Bill for the purpose of suspending the powers of the Water Companies to increase their charges for water consequent upon any increase that may be made in the assessment of property in the county of London in the quinquennial valuations; and that it be referred to the Parliamentary Committee to take the necessary steps for the purpose." The recommendation was deferred.

**The Thirlmere Scheme of the Manchester Corporation.**—The new reservoir which is being constructed on Prestwich Hills in connection with the Thirlmere water scheme of the Manchester Corporation is progressing favourably—a great advance having been made in the work. Two of the embankments are completed as far as the earthwork is concerned; and the third is in a forward state. The excavation is practically finished; and the "puddling" will be completed immediately the banks are ready. An important feature is the sluice (18 feet deep) which has been built at the north-east end of the reservoir. By means of this sluice, during foggy, dirty weather, the water can be lowered 2 feet, and the fog drawn from its surface. The work-

men have commenced to face the banks with stone. The reservoir, which has been in progress about sixteen months will, it is expected, be completed in April next year. The contract which has given most trouble in connection with this gigantic scheme, is that known as No. 4—the portion of the aqueduct extending for 15 miles 638 yards from Windermere through Oxenholme. This has been let to Messrs. Monk and Newell, of Liverpool; and there is every reason to believe the whole of the contracts will now proceed without obstacle or delay.

**The Northern Coal Trade.**—Very considerable dulness has shown itself in several branches of the coal trade in the North. This is due to the fact that there is now a full production of coal in Yorkshire, and the demand has fallen into its usual channels; while for both gas and household coals the demand decreases every week. Northumbrian coal is steady; the best steam being now quoted at 12s. 6d. per ton, free on board, and small coal at about 8s. per ton. In the course of a month it is expected that the Cronstadt navigation will be open, and large quantities of Northumbrian coals are sent there. In the gas coal trade, one or two large collieries have been idle, and this has kept down the shipments; but the demand is necessarily falling now. The price for best gas coals is about 13s. per ton. For manufacturing coals, the demand is good; but there is more bunker coal in the market, and prices are easier. Household coals are depressed; the demand having fallen, and the stocks being large. For the next week or so the holidays will check production, and also the consumption both for manufacturing and for gas-making purposes; so that the market may be expected to be rather irregular. But, besides this, the blowing out of furnaces means a much less consumption of fuel from several of the coalfields; so that, apart from the export demand, there are some signs of easiness in the coal trade for the summer.

**Electric Lighting in Northampton.**—The Licence which was applied for by the Northampton Electric Light Company has been granted to them; and they are now in a position to begin laying their distributing mains. The Company, while relying upon the Licence for the commencement of their work, have decided that the interests of the shareholders, as well as of the town generally, demanded that the more permanent authorization afforded by a Provisional Order should be sought during the present session of Parliament. The Town Council and two Rural Sanitary Authorities have concurred in the Company's proposals. There is one exception—viz., the Hardingstone Local Board, which has jurisdiction over the important and growing suburbs of St. James' End, Cotton End, and Far Cotton. These are excluded from the Licence; and the Board, at a meeting in January, passed a resolution against the districts in question being included in the Provisional Order. Many of the principal landowners and inhabitants, it is said, felt this to be a very mistaken and retrograde policy. Memorials to the Board on the subject were largely and influentially signed; and on Monday of last week a special meeting was held to consider them, and to receive a deputation on the subject. After much discussion, six members voted for the rescinding of the previous resolution and six against; and as the Chairman refused to give his casting vote, matters remain as they were.

**The Public Lighting of Bristol.**—On Thursday last a special meeting of the Sanitary Committee of the Bristol Town Council was held, to receive the report of a Sub-Committee with regard to negotiations pending as to the renewal of the contract for lighting the streets with gas. The contract with the Gas Company was due to terminate at four o'clock on Friday afternoon. The Committee, it appeared, recently asked that gas of a minimum illuminating power of 15 candles should be supplied, instead of 13·5 candles as at present. Thereupon the Directors of the Company invited an interview with the Committee. This was granted; and the result was reported on Thursday. The Directors expressed their willingness to continue, if possible, to supply gas of 15-candle power; but they declined to be bound by any undertaking in writing to give more than their Act of Parliament required. They desired that a strike clause should be inserted in the new contract to relieve them, in the event of a strike, of the statutory obligation to light the streets in any case either with gas or oil. The Committee resolved unanimously not to allow this clause. In the course of a discussion, it was suggested that the Committee should submit a specification to the Directors for a higher standard of illuminating power, and ask them to give a price for supplying gas of that quality, but the idea was not adopted. It may be added that notice of an increase in the price of gas to private consumers of 2d. per 1000 cubic feet has been given by the Company.

**The "Otto" Gas-Engine Patents.**—Last Friday, a motion was made by Mr. F. Moulton, Q.C., before Mr. Justice Chitty, on behalf of the plaintiffs in an action *Andrews v. Crossley*, for an injunction to restrain the defendants from threatening to bring actions for infringement of the defendants' patents for the "Otto" gas-engine against the plaintiffs and their customers. Mr. Lawson appeared for the defendants. The plaintiffs, according to Mr. Moulton's statement, are a limited Company having their registered office at Wigan, and they manufacture a gas-engine known as the "Stockport" engine, one of the rivals of the defendants' engine. The affidavit of the General Manager of the plaintiffs—Mr. Alfred Rowe Ellerby—which was read in support of the motion, stated that the defendants had for several years threatened the plaintiffs and their customers with actions, but had never commenced or prosecuted them. On the 16th of October last they wrote demanding that the plaintiffs should cease infringing their patents. In reply to Mr. Justice Chitty, Mr. Moulton said the plaintiffs denied the infringement. But Mr. Lawson said there was no denial; it was a mere statement that they were advised and believed there was no infringement. A Company could not believe. Mr. Justice Chitty said he agreed that there was something in that objection. A Company might be advised; it could not believe. But another affidavit putting this matter right could be made. Mr. Lawson said the defendants were perfectly willing to bring an action, and give an undertaking in the meantime. It was then arranged that the defendants should bring an action for infringement of their patent, and that the plaintiffs should give the usual undertaking in damages until judgment or further order—a cross-undertaking being given by the defendants, and the costs to be costs in the action.

**The Electric Light Wire Accident at Brighton.**—In the London Sheriff's Court last Thursday, an action remitted from the High Court of Justice for the assessment of damages, in which Emma Garman, of 7, Rugby Place, Kemp Town, Brighton, sued the Brighton and Hove Electric Light Company to recover £1000 compensation for the loss of her husband, who was killed by a shock from one of their electric wires, came before Mr. Under-Sheriff Burchell and a jury. Mr. C. Chapman and Mr. Higgins appeared for the plaintiff; Mr. Pike and Mr. Ruegg represented the defendants. In opening the case, the learned Counsel said the Company were lighting a portion of Brighton by means of the electric light, and in consequence one of their wires was hung over the premises of Messrs. Abby and Hallett, brewers. The plaintiff's husband, Thomas Hill Garman, was employed there as an engineer and night watchman. On the night of the 14th of July last year he was engaged in the latter capacity, having as a portion of his duty to attend to a vat on the top of the building, over which hung an electric wire. This wire, it was admitted on the part of the Company, was negligently hung in a drooping condition; and the deceased, in attending to the vat in question, accidentally touched the wire. The result was that the unfortunate man was killed on the spot. He left a widow and six children, the eldest of whom was only eight years of age. Deceased was a steady workman, and received 22s. per week. The plaintiff was called, and bore out the opening statement. In cross-examination, she said her husband was 32 years of age. Out of his earnings he gave her 20s., with which to keep the family. Dr. Lowe said he conducted the *post-mortem* examination. He was astonished at the healthy condition of the man, who had evidently been struck by a wire charged with more than 2000 volts of electricity. This was the immediate cause of death. This evidence was objected to by Mr. Pike, although the Company admitted that the wire was fully charged. An Actuary stated that, calculating a man's life upon insurance grounds, at the age of 32, and with a weekly wage of 22s., the amount would be £1090 12s. Mr. Pike, for the defendants, said it was a very unfortunate accident for the poor woman; but the jury would have to banish all thought of sympathy from their minds, and render justice to both sides. The jury, after a short consultation, returned a verdict for the plaintiff, and awarded £800 as compensation—£200 for herself, and £100 for each child. Judgment entered accordingly, with costs.

## GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

**For Stock Market Intelligence, see ante, p. 588.**

| Issue. | Share | When ex-Dividend. | Dividend or Div. & Bonus. | NAME. | Paid per Share | Closing Prices. | Rise or Fall in Wk. | Yield upon investment. |
|---|---|---|---|---|---|---|---|---|
| £ | | | p. c. | GAS COMPANIES. | | | | £ s. d. |
| 590,000 | 10 | 16 Oct. | 10½ | Alliance & Dublin 10 p. c. | 10 | 17½–18½ | –½ | 5 13 6 |
| 100,000 | 10 | „ | 7½ | Do. 7 p. c. | 10 | 12–13 | –½ | 5 15 9 |
| 300,000 | 100 | 2 Jan. | 5 | Australian (Sydney) 5 % Deb. | 100 | 109–111 | .. | 4 10 1 |
| 100,000 | 20 | 28 Nov. | 8 | Bahia, Limited . . . . . | 20 | 20–21 | .. | 7 12 4 |
| 200,000 | 5 | 14 Nov. | 7½ | Bombay, Limited . . . . | 5 | 6–6½ | .. | 5 15 4 |
| 40,000 | 5 | „ | 7½ | Do. New . . . . . | 4 | 4½–5½ | .. | 5 17 10 |
| 380,000 | Stck. | 27 Feb. | 12½ | Brentford Consolidated . . | 100 | 217–222 | .. | 5 10 4 |
| 125,000 | „ | „ | 9½ | Do. New . . . . . | 100 | 160–165 | .. | 5 12 2 |
| 220,000 | 20 | 13 Mar. | 11 | Brighton & Hove Original . | 20 | 40–42 | .. | 5 4 9 |
| 320,000 | 20 | 28 Mar. | 11½ | British. . . . . | 20 | 44–46' | .. | 4 17 10 |
| 50,000 | 10 | 13 Mar. | 11 | Bromley, Ordinary 10 p. c. . | 10 | 18–20 | .. | 5 10 0 |
| 39,000 | 10 | „ | 8 | Do. 7 p. c. . | 10 | 13–14 | .. | 5 14 3 |
| 328,750 | 10 | 14 Nov. | 10 | Buenos Ayres (New) Limited | 10 | 12½–13½ | .. | 7 8 2 |
| 200,000 | 100 | 2 Jan. | 6 | Do. 6 p. c. Deb. . | 100 | 105–108 | .. | 5 11 1 |
| 150,000 | 20 | 27 Feb. | 8 | Cagliari, Limited . . . . | 20 | 25–27 | .. | 5 18 4 |
| 550,000 | Stck. | 16 Oct. | 13⅜ | Commercial, Old Stock . . | 100 | 250–255 | .. | 5 7 10 |
| 130,680 | „ | „ | 10⅔ | Do. New do. . . . | 100 | 200–210 | .. | 5 2 4 |
| 130,000 | „ | 30 Dec. | 4½ | Do. 4½ p. c. Deb. do. | 100 | 118–123 | .. | 3 13 2 |
| 557,320 | 20 | 12 Dec. | 13 | Continental Union, Limited . | 20 | 46–47 | .. | 5 10 8 |
| 242,680 | 20 | „ | 13 | Do. New '69 & '72 | 14 | 31–33 | .. | 5 10 3 |
| 200,000 | 20 | „ | 10 | Do. 7 p. c. Pref. . | 20 | 37–39 | .. | 5 2 6 |
| 75,000 | Stck. | 28 Mar. | 10 | Crystal Palace District . . | 100 | 195–205* | +2½ | 4 17 7 |
| 234,060 | 10 | 30 Jan. | 13 | European, Limited . . . . | 10 | 23–25 | .. | 5 4 0 |
| 120,000 | 10 | „ | 13 | Do. New . . . . | 7½ | 17½–18½ | .. | 5 5 3 |
| 354,060 | 10 | „ | 13 | Do. do. . . . | 5 | 12–13 | .. | 5 0 0 |
| 5,470,620 | Stck. | 13 Feb. | 13⅜ | Gaslight & Coke, A, Ordinary | 100 | 246–251 | +1 | 5 9 6 |
| 100,000 | „ | „ | 4 | Do. B, 4 p. c. max. | 100 | 100–103 | .. | 3 17 8 |
| 665,000 | „ | „ | 10 | Do. C, D, & E, 10 p.c. Pf. | 100 | 250–255 | .. | 3 18 5 |
| 30,000 | „ | „ | 5 | Do. F, 5 p. c. Prf. . | 100 | 121–125 | .. | 4 0 0 |
| 60,000 | „ | „ | 7½ | Do. G, 7½ p. c. do. . | 100 | 180–185 | .. | 4 1 1 |
| 1,300,000 | „ | „ | 7 | Do. H, 7 p. c. max.. | 100 | 159–164 | +1 | 4 5 4 |
| 463,000 | „ | „ | 10 | Do. J, 10 p. c. Prf. . | 100 | 247–252 | .. | 3 19 4 |
| 1,061,150 | „ | 12 Dec. | 4 | Do. 4 p. c. Deb. Stk. | 100 | 114–117 | .. | 3 8 5 |
| 294,850 | „ | „ | 4½ | Do. 4½ p. c. do. | 100 | 122–127 | .. | 3 10 10 |
| 650,000 | „ | „ | 6 | Do. 6 p. c. do. | 100 | 160–170 | .. | 3 10 7 |
| 3,800,000 | Stck. | 14 Nov. | 12 | Imperial Continental . . . | 100 | 217–222 | .. | 5 8 1 |
| 75,000 | 5 | 12 Dec. | 6 | Malta & Mediterranean, Ltd. | 5 | 5–5⅛ | .. | 5 9 1 |
| 560,000 | 100 | 1 Oct. | 5 | Met. of Melbourne, 5 p. c. Deb. | 100 | 114–116 | .. | 4 6 2 |
| 541,920 | 20 | 28 Nov. | 6 | Monte Video, Limited. . . | 20 | 18½–19½ | .. | 5 3 1 |
| 150,000 | 5 | 28 Nov. | 10 | Oriental, Limited . . . . | 5 | 8½–9 | .. | 5 11 1 |
| 60,000 | 5 | 28 Mar. | 7 | Ottoman, Limited . . . . | 5 | 5⅝–6* | .. | 5 16 8 |
| 166,870 | 10 | 26 July | 4 | Pará Limited. . . . . | 10 | 3⅜–4⅜ | .. | 8 17 9 |
| 420,000 | 100 | 2 Nov. | 6 | People's Gas of Chicago— 1st Mtg. Bds.. . . . | 100 | 100–105 | .. | 5 14 3 |
| 500,000 | 100 | 2 Dec. | 6 | 2nd Do. . . . | 100 | 95–100 | .. | 6 0 0 |
| 100,000 | 10 | 16 Oct. | 10 | San Paulo, Limited . . . | 10 | 14⅜–15⅜ | .. | 6 9 2 |
| 500,000 | Stck. | 27 Feb. | 13⅜ | South Metropolitan, A Stock | 100 | 275–285 | .. | 4 12 11 |
| 1,350,000 | „ | „ | 11⅔ | Do. B do. . | 100 | 220–230 | .. | 5 0 0 |
| 141,500 | „ | „ | 12 | Do. C do. . | 100 | 230–240 | .. | 5 0 0 |
| 650,000 | „ | 30 Dec. | 5 | Do. 5 p. c. Deb. Stk. . | 100 | 137–142 | .. | 3 10 5 |
| 60,000 | 5 | 27 Feb. | 11½ | Tottenham & Edm'nton, Orig. | 5 | 11–13 | .. | 4 8 5 |
| | | | | WATER COMPANIES. | | | | |
| 728,146 | Stck. | 30 Dec. | 9⅜ | Chelsea, Ordinary . . . . | 100 | 260–265 | .. | 3 11 8 |
| 1,720,560 | Stck. | 16 Oct. | 7½ | East London, Ordinary . . | 100 | 209–214 | .. | 3 10 1 |
| 544,440 | „ | 30 Dec. | 4½ | Do. 4½ p. c. Deb. Stk. . | 100 | 143–148 | .. | 3 0 10 |
| 700,000 | „ | 50 12 Dec. | 9 | Grand Junction . . . . . | 50 | 122–126 | –1 | 3 11 5 |
| 708,000 | Stck. | 13 Feb. | 10⅔ | Kent . . . . . | 100 | 271–276 | .. | 3 16 0 |
| 1,043,800 | 100 | 30 Dec. | 9⅓ | Lambeth, 10 p. c. max. . . | 100 | 254–258 | .. | 3 13 7 |
| 406,300 | 100 | „ | 7½ | Do. 7½ p. c. max. . . | 100 | 197–202 | .. | 3 14 3 |
| 200,000 | Stck. | 28 Mar. | 4 | Do. 4 p. c. Deb. Stk.. | 100 | 122–126* | .. | 3 3 6 |
| 500,000 | 100 | 13 Feb. | 12½ | New River, New Shares . . | 100 | 360–365 | .. | 3 6 5 |
| 1,000,000 | Stck. | 30 Jan. | 4 | Do. 4 p. c. Deb. Stk . | 100 | 127–130 | .. | 3 1 6 |
| 902,300 | Stck. | 12 Dec. | 6 | S'thwk & V'xhall, 10 p. c. max. | 100 | 160–165 | –½ | 3 12 9 |
| 126,500 | 100 | „ | 6 | Do. 7½ p. c. do. | 100 | 157–162 | .. | 3 14 1 |
| 155,066 | Stck. | 12 Dec. | 10 | West Middlesex. . . . | 100 | 260–265 | .. | 3 15 6 |

*Ex.div.

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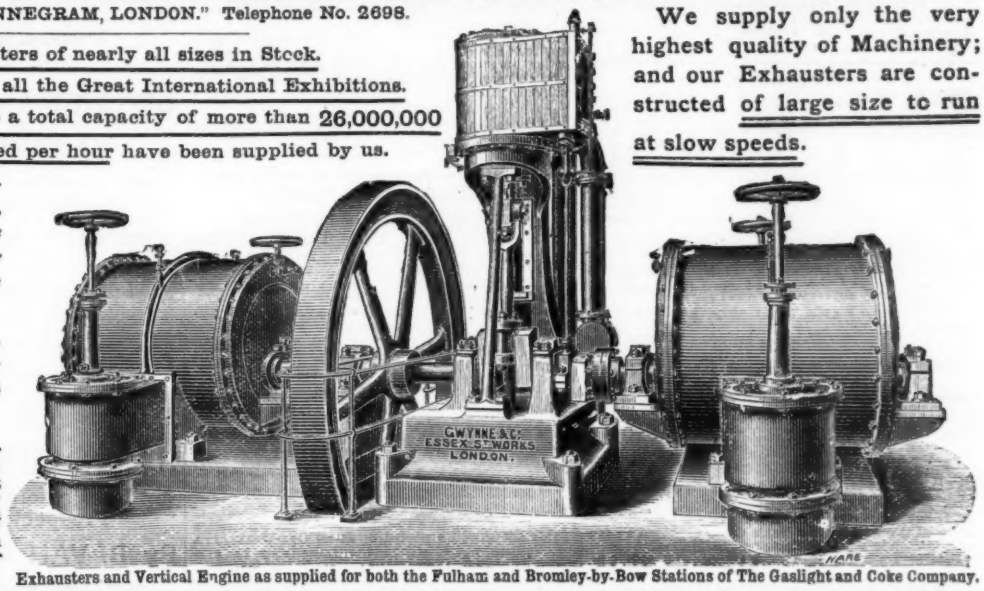


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**THE Directors desire to inform the** APPLICANTS for the Situation of ASSISTANT MANAGER that the post is now filled; but, owing to the number of applications, they regret being unable to reply separately.

Original testimonials will be returned.
March 29, 1890.

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Apply, by letter, to No. 1804, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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Applications, endorsed "Gas Manager," must be forwarded to the undersigned, stating age, qualifications, and salary required, not later than Tuesday next, the 8th of April, 1890, accompanied by copies of not more than three recent testimonials.

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Town Clerk.

Corporation Offices, Bury.

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TAR FOR SALE.

**THE Communal Administration of** Brussels will proceed on the 20th of May, 1890, to open TENDERS for the purchase of TAR produced from the Gas-Works, from the 1st of October, 1890.

The Contract is divided into Two Lots—the first comprising 3600 tons; and the second, 5400 tons.

For full particulars, address M. LE DIRECTEUR DE L'USINE A GAZ, Rue du Chêne 8a, BRUSSELS.

GAS PLANT FOR SALE.

**THE Wigan and Whiston Coal Com-**pany, Limited, Prescot, are prepared to receive TENDERS for the whole or any part of their GAS PLANT, consisting of Morton's Patent Mouthpieces, Ascension, Seal, and Dip Pipes, 74 feet of Hydraulic Mains (20 in. by 20 in. U shaped), Condensers (two rows of 2 feet diameter Pipes, three heights, by 56 feet long), Two Tar Extractors (10 ft. by 2 ft. diameter), 81 feet of 14-inch diameter Pipes, Two Anderson's Four-way Valves, Gas Governor by Orme, Exhauster, Holder (25 ft. by 9 ft.), with Cast-Iron Tank (26 ft. by 9 ft.), bolted together in segments, Purifier (8 ft. by 6 ft.), Two Scrubbers, &c.

The whole of the Plant will be put free on Trucks.

For further particulars, or to view, apply to the above-named Company.

The highest or any tender not necessarily accepted.

TENDERS FOR TAR.

**THE Directors of the Devonport Gas** Company invite TENDERS for the surplus TAR produced on their Works, for the Twelve months terminating the 1st of May, 1891.

Monthly accounts.

Tenders, addressed to the Chairman of the Devonport Gas Company, to be posted on or before the 18th of April next.

JNO. WILLIAMS, Secretary.

**EXTRACT from the Harrogate Gas** Company's Report, dated the 5th of February, 1890: Coal consumed, 8600 tons. Gas made, 92,880,000 feet; ditto sold, 84,880,000 feet; ditto unaccounted for, 8,000,000 feet; quantity made per ton, 10,800 feet; ditto sold, 9869 feet. Illuminating Power, 16·1 candles. Coals used, Brancepeth. Owners, Strakers and Love, Newcastle-on-Tyne; who have also Brandon Hutton Seam Unscreened Gas Coal. Analysis, 10,500 cubic feet per ton; Illuminating Power, 16·2 candles.

---

TO STEEL-PIPE MAKERS.

**THE Sheffield United Gaslight Company** are prepared to receive TENDERS for the supply of a circular STEEL FOUL GAS MAIN, of about the following quantities:—viz., 585 feet of 30 inches diameter, 160 feet of 24 inches diameter, and 210 feet of 12 inches diameter Pipes, with all necessary Bends, Tees, &c.

A copy of the drawings, with further particulars, may be obtained on application to the Company's Engineer, Mr. Fletcher W. Stevenson.

A charge of 10s. 6d. will be made for each copy of the drawings supplied.

Sealed tenders to be delivered to the undersigned on or before Monday, the 14th of April next, endorsed "Tender for Foul Main."

The Company do not bind themselves to accept the lowest or any tender.

HANBURY THOMAS,
General Manager.

Commercial Street, Sheffield,
March 24, 1890.

---

**COUNTY BOROUGH OF ST. HELENS.**
(GAS DEPARTMENT.)

TO GASHOLDER MAKERS.

**THE Gas Committee are prepared to** receive TENDERS for a TWO-LIFT GASHOLDER (capacity, 1 million cubic feet), to be constructed and erected in a Tank to be provided by the Corporation in a field at Eccleston, St. Helens.

Size of Tank, 165 ft. 6 in. diameter, and 26 ft. 6 in. deep.

Tenders, accompanied by drawings, showing methods of construction proposed, and specification, to be delivered, properly endorsed, addressed to the Chairman of the Gas Committee, Gas-Works, Warrington Old Road, St. Helens, on or before the 16th of April.

No. 1 tender to be for Gasholder, with Cast-Iron Columns and Wooden Supports for Crown of Holder.

No. 2 tender to be as above, but with Trussed Roof.

No. 3 tender to be for any new Method of Construction proposed.

Any further details may be obtained from the undersigned.

The Committee do not bind themselves to accept the lowest or any tender.

SAMUEL GLOVER,
Engineer and Manager.

Gas-Works, St. Helens, March 28, 1890.

---

TO PIPEFOUNDERS

**THE Gas Committee of the St. Helens** Corporation are prepared to receive TENDERS for the supply of about 4400 yards of 18-inch Cast-Iron PIPES, in 12-feet lengths; also SPECIAL CASTINGS.

Specifications and forms of tender may be had upon application to the undersigned.

Tenders, properly endorsed, to be delivered on or before Tuesday, the 8th of April, addressed to the Chairman of the Gas Committee, Gas-Works, St. Helens, Lancs.

The Committee do not bind themselves to accept the lowest or any tender.

SAMUEL GLOVER,
Engineer and Manager.

Gas-Works, St. Helens, March 28, 1890.

---

**SCARBOROUGH GAS COMPANY.**

TAR AND AMMONIACAL LIQUOR.

**THE Directors of the Scarborough Gas** Company are prepared to receive TENDERS for the purchase of the AMMONIACAL LIQUOR and surplus TAR produced at their Works for One year, from the 18th day of April next.

Conditions of tender and necessary particulars will be supplied on application to the undersigned, to whom tenders, in accordance with such conditions, and properly endorsed, must be delivered not later than Noon on Monday, the 7th day of April next.

By order,
WILLIAM J. MOON,
Secretary and Manager.

Gas Offices, Scarborough,
March 19, 1890.

---

**TREDEGAR LOCAL BOARD.**

TENDERS FOR RETORT-BENCHES.

**THE above Board invite Tenders for the** erection of certain RETORT-BENCHES, and all the necessary IRONWORK.

Further particulars can be obtained on application to the Gas Manager, Gas-Works, Tredegar.

Sealed tenders to be sent in to me, the undersigned, endorsed "Retort-Benches," on or before the 8th day of April next.

The Board do not bind themselves to accept the lowest or any tender.

By order,
JNO. ALEX. SHEPARD,
Clerk to the said Board.

87, Queen Street, Tredegar,
March 18, 1890.

---

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Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

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Chemist and Superintending Gas Examiner to the London County Council.

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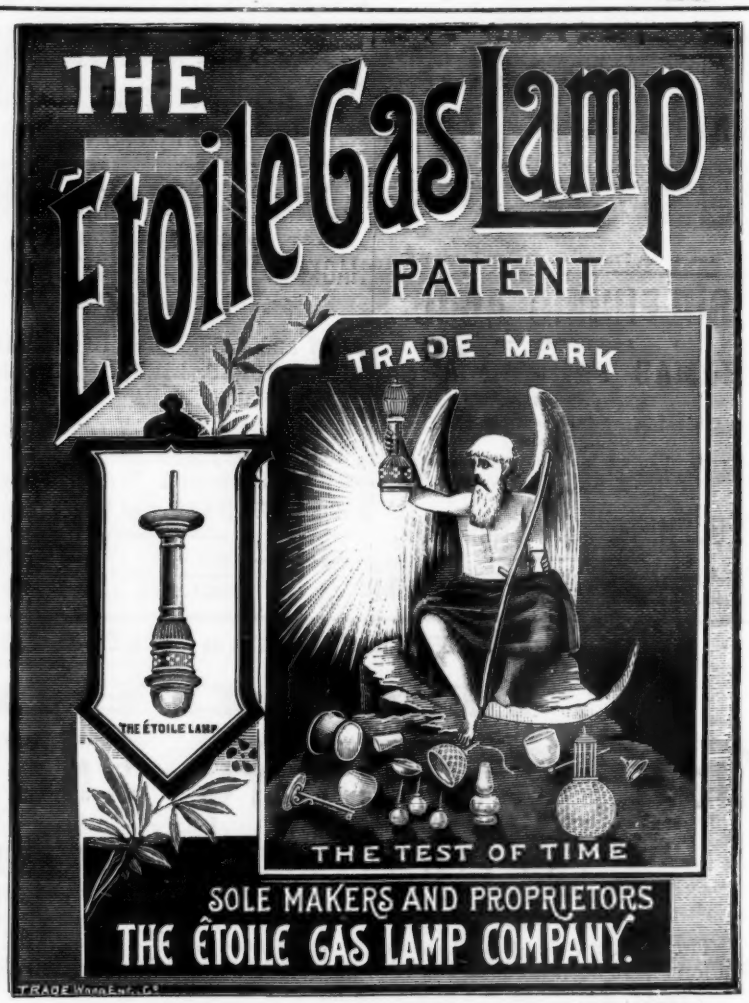


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FOR DOMESTIC AND EXTERNAL LIGHTING.

The only Generative Lamp employing the common flat-flame burners.

Lamps giving 20-Candle Power consume less than 4-feet of Gas per hour.

A PURE WHITE AND PERFECTLY STEADY LIGHT NOT AFFECTED BY DRAUGHTS.

Suitable for any existing fittings (brackets or suspending). Can be fixed in a few minutes

May be seen at the Offices of the

## SCHÜLKE GAS-LAMP COMPANY, LTD.,

ROOM 446—11, QUEEN VICTORIA ST., LONDON, E.C.,

WHERE PRICE LISTS AND FULL PARTICULARS MAY BE OBTAINED.

---

## ALDER AND MACKAY,

MANUFACTURERS OF

# IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.

ORIGINAL MANUFACTURERS OF DRY METERS IN CAST-IRON CASES.

STATION METERS, EXPERIMENTAL METERS, PHOTOMETERS, & PRESSURE-GAUGES, &c.

**Results of Tests of Dry Gas-Meters (Section III.) of the Glasgow Philosophical Society's Gas Exhibition, as per London "Gas Journal," May 10, 1881.**

| | ALDER & MACKAY. | W. & B. COWAN. | G. GLOVER & Co. | JAMES KEITH. | D. B. PEEBLES & Co. |
|---|---|---|---|---|---|
| Total of Fast Tests . . | 47·2 ... | 6·9 ... | 33·6 ... | 62·3 ... | 53·7 |
| Total of Slow Tests . . | 25·3 ... | 117·4 ... | 43·1 ... | 31·4 ... | 38·5 |
| | 72·5 ... | 124·3 ... | 76·7 ... | 93·7 ... | 92·2 |

SOLE AGENTS FOR THE "SENTINEL" GAS GOVERNOR IN SCOTLAND AND IRELAND.

**Descriptive Circulars, Price Lists, and Full Particulars forwarded on application.**

GRANGE WORKS, EDINBURGH.

HIGHEST AWARDS given to our WET and DRY METERS, at Exhibitions held at Glasgow, Calcutta, and Edinburgh.

# JOHN BROTHERTON, LIMITED,

## IMPERIAL TUBE WORKS,

WOLVERHAMPTON,

*Paris Exhibition* 1867.
*Amsterdam Exhibition* 1883.
*Silver Medal and First-Class Certificate*
*Bronze Medal and Special Diploma*
*Adelaide Exhibition* 1887.
*First Order of Merit and Medal.*

MANUFACTURERS OF
WELDED IRON TUBES AND FITTINGS
FOR GAS, STEAM, WATER, &c.
LAP-WELDED TUBES
FOR LOCOMOTIVE, MARINE, AND STATIONARY BOILERS, AND OTHER PURPOSES.
HYDRAULIC AND HOT-WATER TUBES.
COILS OF ALL SIZES AND SHAPES.
Stocks, Taps, Dies, Taper Telegraph Poles, &c., &c.

London Offices: 3, Jeffrey Square, St. Mary Axe, E.C.
Telegraphic Address: "BROTHERTON, WOLVERHAMPTON."

*Paris Exhibition* 1867.
*Calcutta Exhibition* 1883 *and* 1884.
*Silver Medal and First-Class Certificate.*

## ROOTS' PATENT "ACME"

# GAS EXHAUSTERS.

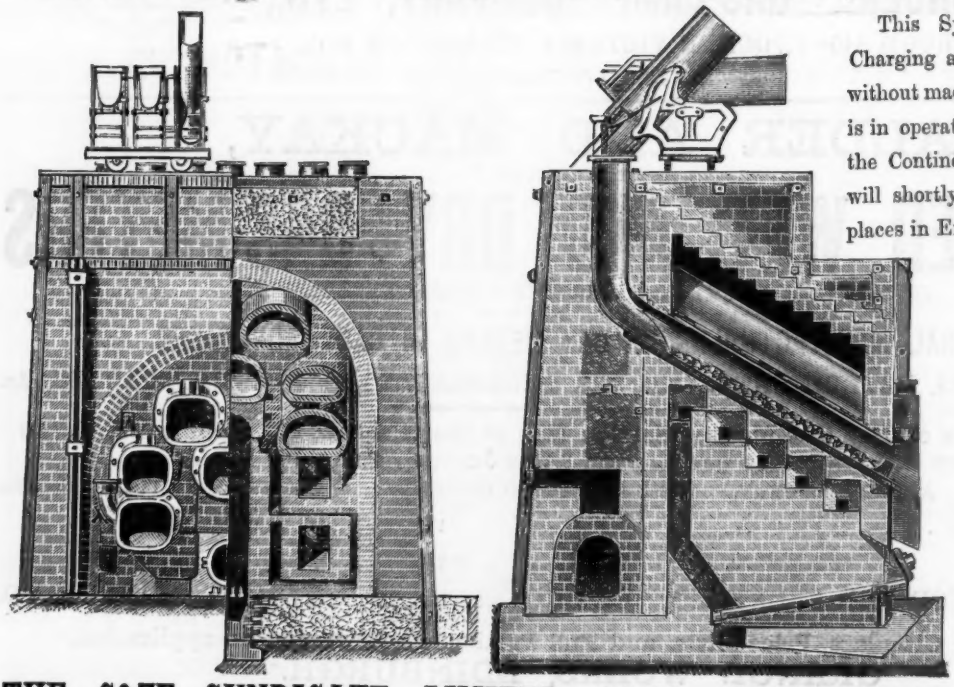
POSITIVE IN ACTION. SIMPLE IN CONSTRUCTION. DURABLE & SOLID IN DESIGN.

All Working Parts external and unaffected by Gas.

**SOLE LICENSEES under Roots' Latest Patents,**

## SAMUELSON & CO., LTD., BANBURY, OXON.

## COZE'S AUTOMATIC SYSTEM
OF
# CHARGING AND DRAWING RETORTS.



This System of Automatically Charging and Discharging Retorts, without machinery or arduous labour, is in operation at several places on the Continent and in America, and will shortly be at work in various places in England.

All information as to advantages, cost, royalties, &c., can be obtained from the undersigned.

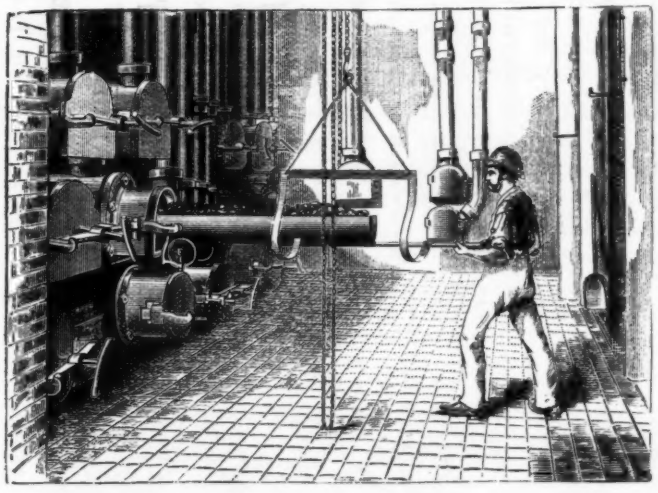
The System is fully patented, and any infringer will be strictly proceeded against.

**GOLD MEDAL,**
**Paris Exhibition, 1889.**

## THE COZE SYNDICATE, LIMITED, 86-88A, LEADENHALL STREET, E.C.

# GAS COAL.

BEST
REAL OLD SILKSTONE GAS COAL.
Address, THE STRAFFORD COLLIERIES COMPANY,
Near BARNSLEY, SOUTH YORKSHIRE.



ATTERTON'S PATENT
Apparatus for Charging Retorts
CAN BE
WORKED BY ONE MAN.

*Write for Price List and Particulars to the SOLE MAKER and PATENTEE—*

JOHN ATTERTON,
ENGINEER,
HAVERHILL, SUFFOLK.
LONDON AGENTS—
*The THAMES BANK IRON Co., Upper Ground St.*

# RETORT SETTINGS IMPROVED
BY ADOPTING
THE "NUGENT" & "ROBUS" SETTINGS.

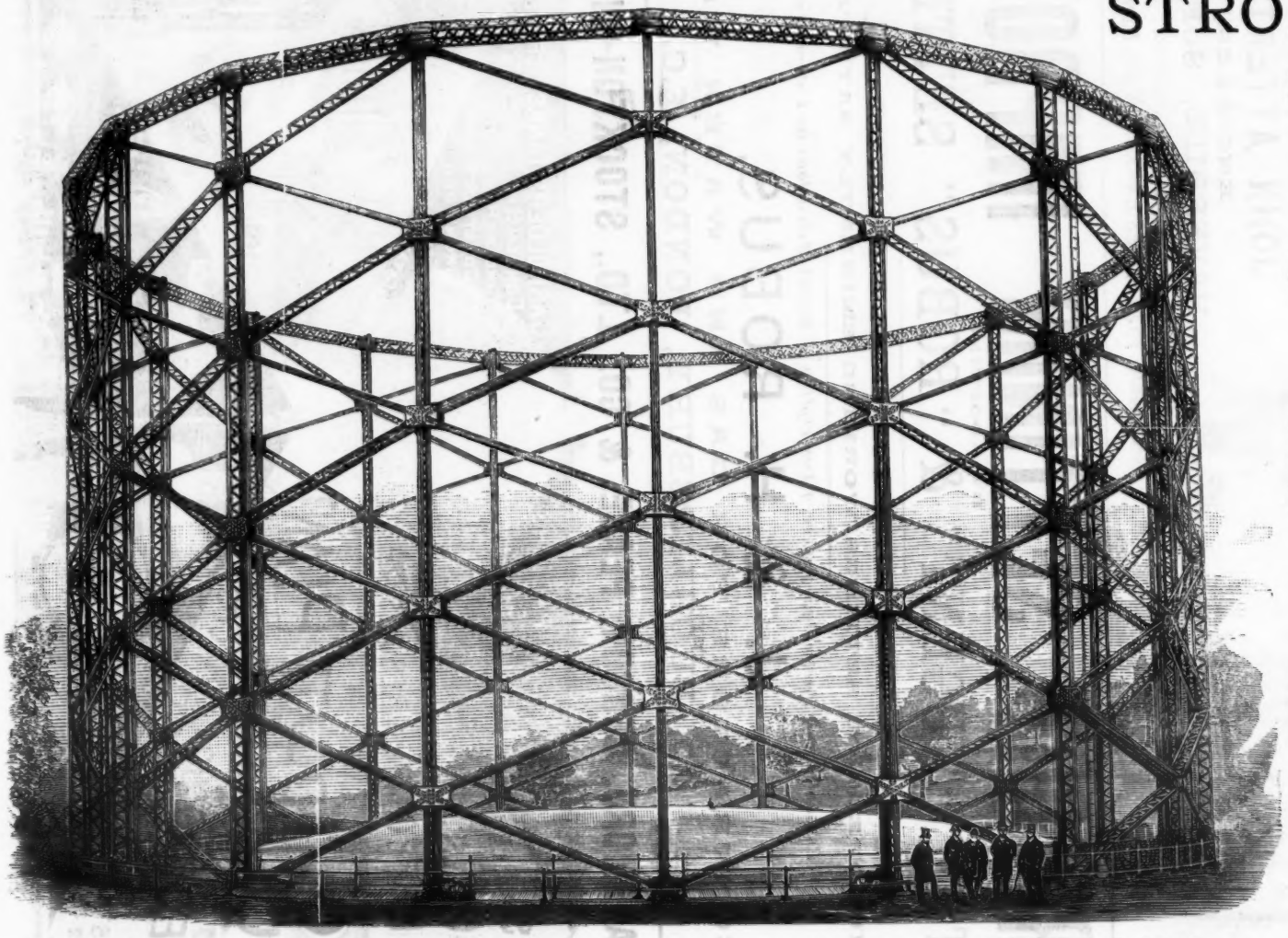
ECONOMY WITH DURABILITY GUARANTEED.
HUNDREDS OF SETTINGS WORKING EMINENTLY SATISFACTORY.

*Estimates and Particulars for every Description of Retort Extensions and other Work.*

J. & H. ROBUS,
CONTRACTORS FOR GAS AND WATER WORKS,
20, BUCKLERSBURY, LONDON, E.C.

ASHMORE, BENSON, PEASE, & CO., LTD., STOCKTON-ON-TEES.

# Cutler's Spiral Guide-Framing for Gasholders.



Tunbridge Wells Gas-Works—Cutler's Patent Guide-Framing—Erected 1889.

STRONG.

SAFE.

CHEAP.

*Most Advantageous Disposition of Material.*

Economical both in Manufacture and Erection; and by avoiding the necessity for large Piers, permitting considerable Economy in the Construction of the Tank.

*Full Particulars from the Patentees,*

**MESSRS.**

## S. CUTLER & SONS,

ENGINEERS,

GREAT GEORGE STREET CHAMBERS,

16, GREAT GEORGE STREET,

**WESTMINSTER, S.W.**

*Works: Millwall, London, E.*

JAMES D. PERKINS. F. SEAVERNS.

# PERKINS & Co.,

228 & 229, PRODUCE EXCHANGE, NEW YORK.

*Cable Address: "PERKINS, NEW YORK."* *Post Office Box 3695, New York.*

SOLE AGENTS FOR THE CELEBRATED

# BRECKENRIDGE CANNEL

AND THE

# OLD KENTUCKY BOGHEAD

OF KENTUCKY, U.S.A.

These Cannels will rank with the Australian Shale for Gas Manufacture.

Also General Sales Agents for

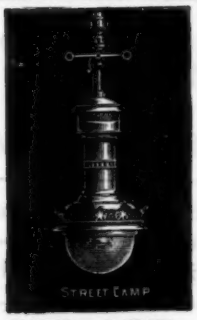
## PENNSYLVANIA & VIRGINIA GAS COALS, & AMERICAN FOUNDRY & FURNACE COKE.

Delivery Prices made to any Port in

## GREAT BRITAIN, ON THE CONTINENT, OR SOUTH AMERICA.

Full Information furnished upon Application to the above Address.

"LIGHT, Wenham Gas Lamps MORE LIGHT."



ITS ADVANTAGES ARE:

**IMMENSE ECONOMY IN THE CONSUMPTION OF GAS.**

INTENSITY, PURITY, AND STEADINESS OF THE LIGHT.

*Absence of Downward Shadow.* *Practical Completeness of Combustion.*

**CAN BE FITTED TO ORDINARY SUPPLY-PIPES WITHOUT ALTERATION.**

CAN BE USED AS VENTILATING LIGHTS, whereby the products are removed, and damage to decorations, &c., prevented.

SOLE PROPRIETORS AND MANUFACTURERS: **THE WENHAM COMPANY, LIMITED.**

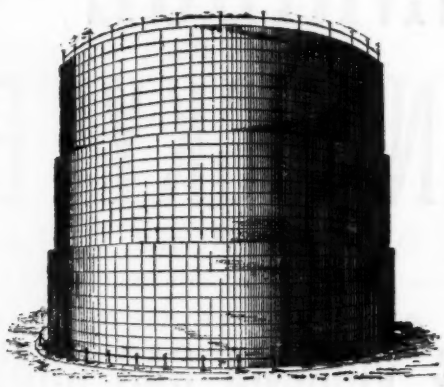
Birmingham Branch: 121, CORPORATION STREET. Works: UPPER OGLE ST., LONDON, W. Manchester Branch: 5, DEANSGATE.

# REVOLUTION
## IN GASHOLDER CONSTRUCTION.
**(GADD & MASON'S PATENTS.)**

IMMENSE SAVING IN COST.
IMMENSE SAVING IN COST.
IMMENSE SAVING IN COST.

NO COLUMNS. NO FRAMING
NO COLUMNS. NO FRAMING.
NO COLUMNS. NO FRAMING.

NO PIERS ROUND TANK.
NO PIERS ROUND TANK.
NO PIERS ROUND TANK.



IMMENSE SAVING IN COST.
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NO COLUMNS. NO FRAMING.
NO COLUMNS. NO FRAMING.
NO COLUMNS. NO FRAMING.

NO PIERS ROUND TANK.
NO PIERS ROUND TANK.
NO PIERS ROUND TANK.

## GREATER STABILITY. TILTING IMPOSSIBLE.

*Tank Construction rendered far simpler and very much cheaper; the Piers and heavy Base Stones being dispensed with.*

In Holders for Export a very large additional saving is effected in Carriage, Freight, Transport, and Insurance; the weight being reduced nearly **50 per cent.**

**Admitted by eminent Engineers to be the system of the future.**

Our Alternative Arrangements of Torsional and Tensional Gearing **WE DO NOT RECOMMEND.** The former, by means of Geared Shafting, or Rack and Pinion, **IS CLUMSY**; whilst the latter, by means of Chains or Ropes, **IS UNRELIABLE AND DANGEROUS.**

**Engineers intending to extend their Gas Storeage should not fail to see the TWO-LIFT HOLDER erected for the Northwich Gas Company.**

*PLANS, SPECIFICATIONS, AND ESTIMATES SUPPLIED.*

Telegrams: "SPIRAL MANCHESTER."

# The PATENT GASHOLDER SYNDICATE,
## 504, STOCKPORT ROAD, MANCHESTER.

# WATER GAS FUEL GAS

## FOR INDUSTRIAL PURPOSES

GENERATED FROM

## BITUMINOUS SLACK COAL

BY THE

# LOOMIS PROCESS.

The Cheapest Gas-Generating System in the World.

**NOVEL IN DESIGN.**
**MODERN IN CONSTRUCTION.**
**SIMPLE IN OPERATION.**
**PERFECT IN RESULTS.**

*PROCESS AND APPARATUS PATENTED IN ALL COUNTRIES.*

By this system more gas, and of a higher heating power per cubic foot, can be generated from a ton of Bituminous Slack Coal than by any other from a ton of Anthracite Coal or Coke.

The successful application of Water Gas for industrial purposes was brought about through this Process at the Works of the—

**JOHN RUSSELL CUTLERY COMPANY, Turner's Falls, Mass., where it has been in daily use upwards of two years, doing all the Forging, Hardening, and Tempering.**
**HENRY DISSTON & SONS, Steel, Saw, and File Works, Philadelphia.**
**AMERICAN WALTHAM WATCH COMPANY, Waltham, Mass.**
**ADDYSTON PIPE AND STEEL COMPANY, Cincinnati.**

Many other industrial establishments in America are successfully using this Process, and a large number of Works are now being erected, including a plant at Brussels and at Sheffield (at Messrs. Thomas Firth and Sons, Limited).

**This process is especially adapted for firing all classes of Pottery, Tile, and Brick Kilns.**

*For particulars apply to*

## NEWTON, CHAMBERS, & CO., LIMITED,

**THORNCLIFFE IRON-WORKS, near SHEFFIELD.**

# WEST'S GAS IMPROVEMENT Co., Ltd.,

*Engineers, Ironfounders, & Contractors,*

## ALBION IRON-WORKS, MILES PLATTING, MANCHESTER,

MANUFACTURERS OF

## WEST'S PATENTED MACHINERY

FOR

# CHARGING AND DRAWING GAS-RETORTS.

OVER **160** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.

*Advantages attending its use are:—*

**INCREASED VOLUME of GAS per TON, and INCREASED YIELD per Retort.**—The system of breaking and distributing the coals in an even layer in the retorts effecting more perfect carbonization.

**REDUCTION in LABOUR and COST of WORKING.**—In Works where this System of charging and drawing Retorts is adopted, there has been effected a substantial saving in the cost of Gas Manufacture in the Retort-House; the amount saved varying in different Gas-Works from **8 PENCE** to **15 PENCE per Ton** of coal carbonized. Full particulars will be forwarded upon application to W. G. I. Company, Limited.

**MANUAL CHARGING AND DRAWING MACHINES.**

**POWER CHARGING AND DRAWING MACHINES, driven by WIRE ROPE, STEAM, or COMPRESSED AIR.**—The power machines are applicable to circular, oval, or Ω-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made. They are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.

Sole Makers of **Circular, Oval,** or Ω-shaped **Mouthpieces,** with Morton's Self-Sealing Lids fitted with

## KING'S PATENT FASTENINGS,

which, by a simple wedging action at each end of the crossbar, secure a very tight joint; and at the same time, by their long sliding motion, they effectually remove the tar or other matter from the surfaces of the mouthpiece and lid.

**N.B.—The whole of these Fittings are made of Wrought Iron.**

*Estimates and further particulars forwarded upon application for Mouthpieces complete, or for Lids and Fastenings separately.*

**Makers of THOMAS & SOMERVILLE'S COKE-BREAKING MACHINE.**
**Sole Makers of WHITE'S PATENT AUTOMATIC GAS-VALVE.**

**Mr. JOHN WEST, M. Inst. C.E., Managing Director.**

ILLUSTRATED CATALOGUE SENT UPON APPLICATION.

# BELL'S ASBESTOS AQUOL PAINT

BELL'S ASBESTOS

## IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

**No expensive Oil or Turpentine required.**

WILL NEVER BLISTER.

HAS A COVERING CAPACITY **40** PER CENT. GREATER THAN LEAD PAINTS.

## For Outside or Inside Work in any Climate.

**Bell's Asbestos Aquol Paint** is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

**Bell's Asbestos Aquol Paint** is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

**BELL'S ASBESTOS AQUOL PAINT** is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

*Those who Study Economy and Protection from Fire should use only*

## BELL'S ASBESTOS AQUOL PAINT.

**BELL'S ASBESTOS AQUOL PRIMING** is made Ready for Use.
**BELL'S ASBESTOS AQUOL PRIMING** stops all suction of Wood, Cement, Plaster, &c.
**BELL'S ASBESTOS AQUOL PRIMING** should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

*BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.*

AN EXCELLENT CURE FOR DAMP WALLS.

**Colour Cards and Price Lists on Application.**

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

## BELL'S ASBESTOS COMPANY, LIMITED,

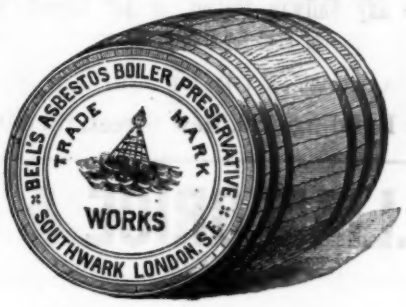
SOUTHWARK, LONDON, S.E.

DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. CARDIFF: West Bute Street. BIRMINGHAM: 7, John Bright Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. BERLIN, BARCELONA, and ANTWERP.

# BELL'S ASBESTOS BOILER PRESERVATIVE

**Will remove Incrustation from Steam-Boilers of all kinds without chipping.**

A shows Boiler Plates when incrusted.
B shows Boiler Plates when cleaned by this Composition.




Every Cask is sent out as above.

The action of this **BOILER PRESERVATIVE,** by absorbing the free oxygen that is in the water, **entirely checks pitting and corrosion.** It also disintegrates incrustation so immediately as to prevent its adhering to the plates; and the deposit falls to the bottom in a loose powder, which is easily swept out. By keeping boilers clean, a **great economy of fuel is effected,** and the danger of the plates burning is entirely obviated; thus avoiding the great risks which are inseparable from scaled plates, lengthening the life of a boiler, and **covering its own cost a hundredfold.** Whenever possible it should be used through Feed Pump or Injector, which it will also keep clear from incrustation. The small quantity required to effect its purpose makes this the most economical, and more than repays the higher price we charge for a fluid which, in the case of many other makers, is useless.

**QUANTITY REQUIRED**—A quarter of a pint weekly per horse power indicated; where the water is very bad rather more, or one pint for every 700 gallons of water evaporated.

# BELL'S ASBESTOS CO., Ld.

**DEPÔTS.**

**MANCHESTER:** Cable St., Blackfriars.
**LIVERPOOL:** 2, Strand St., James St.
**HULL:** Humber Dock Basin.
**DUBLIN, BERLIN.**

**DEPÔTS.**

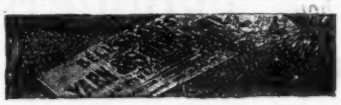
**BIRMINGHAM:** 7, John Bright Street.
**GLASGOW:** 35, Robertson Street.
**CARDIFF:** West Bute Street.
**BARCELONA, and ANTWERP.**

## SOUTHWARK, BELL'S ASBESTOS. LONDON, S.E.

BELLS ASBESTOS

### YARN AND SOAPSTONE PACKING

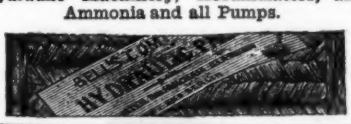
Is the BEST LOCOMOTIVE PACKING made.



BELL'S

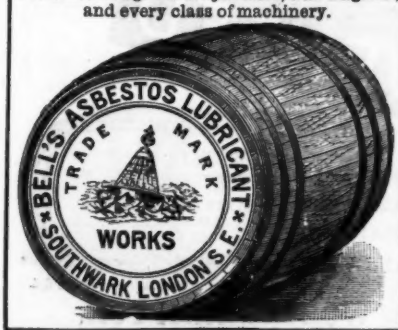
### COMPOUND HYDRAULIC PACKING

Is specially suited for Hydraulic Machinery, Accumulators, and Ammonia and all Pumps.



### BELL'S ASBESTOS LUBRICANT

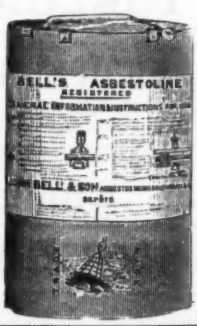
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.




### BELL'S ASBESTOLINE

The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

ASBESTOLINE IS THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRICANT.




ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL.

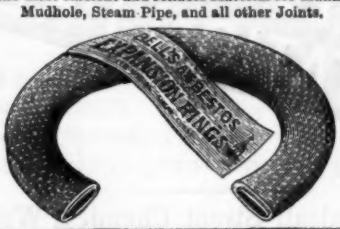
Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS

### EXPANSION SHEETING

RINGS, AND TAPE.

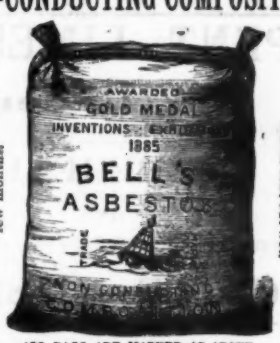
Is the most efficient and reliable Material for Manhole, Mudhole, Steam-Pipe, and all other Joints.




BELL'S ASBESTOS

### NON-CONDUCTING COMPOSITION.

Will reduce loss by radiation, and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



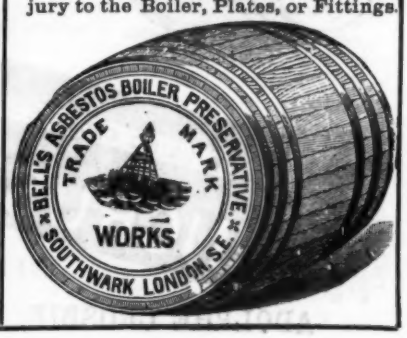

Can be applied again after many years' service. Is sent out dry in bags: therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS

### BOILER PRESERVATIVE

Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



# WILSON CARTER & PEARSON,

**GAS COAL AND CANNEL FACTORS,**

**Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.**

ADDRESS CHIEF OFFICES:

**Temple Buildings, 50, New Street, Birmingham.**

# WILLIAM GRICE & CO.

Ironfounders, Gas and General Engineers,

Fazeley Street Works, BIRMINGHAM.

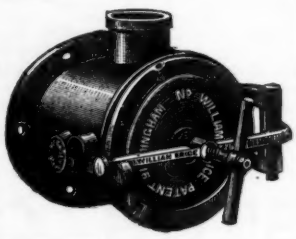
MANUFACTURERS OF

**Grice's Patent Self-Sealing Mouthpieces.**

To suit all sized sections of Retort. Over 70 stock sizes. Largely used in England.

**Grice's Patented Stoking Machinery.**

Made to suit large or small Gas-Works. The one machine draws the spent coke and recharges the Retort at one operation. Self-contained; working from engine on base or by hand. Price and particulars on application.



*PURIFIERS, TANKS, PIPES, & OTHER PLANT MADE.*

Machine-Moulded Spur, Bevel, Mitre, and Helical Wheels and Pulleys, to 20 feet diameter.

WROUGHT-IRON WAREHOUSE CRANES

As supplied to the English Railway Companies.

MORTAR & LOAM MILLS.

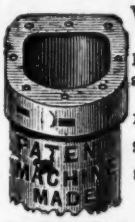
With or without Engines.

PUNCHING AND SHEARING MACHINERY

Of all Kinds.

ENGINES, Vertical and Horizontal; High and Low Pressure CONDENSING BOILERS; Tubular and Ordinary CASTINGS. All descriptions up to 15 tons.

# WILLIAM INGHAM & SONS,




WORTLEY FIRE-CLAY WORKS, Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

# MACHINE-MADE GAS-RETORTS.

# J. & W. HORTON

ETNA WORKS,

SMETHWICK,

NEAR BIRMINGHAM

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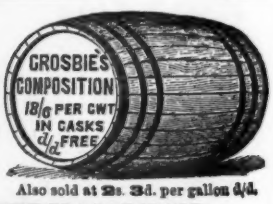


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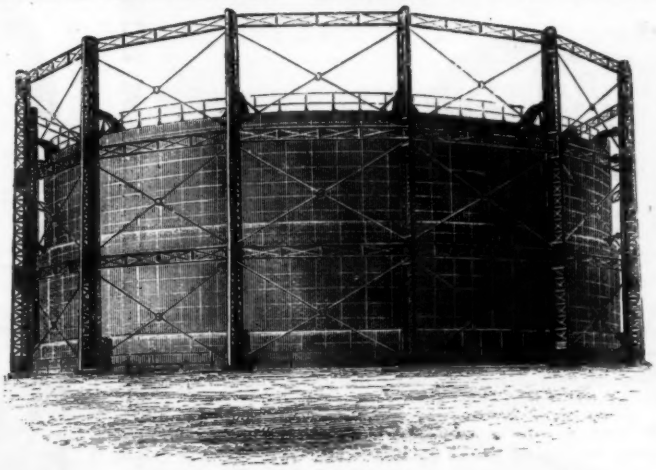

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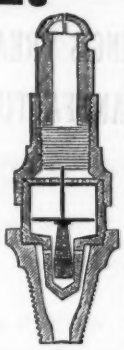

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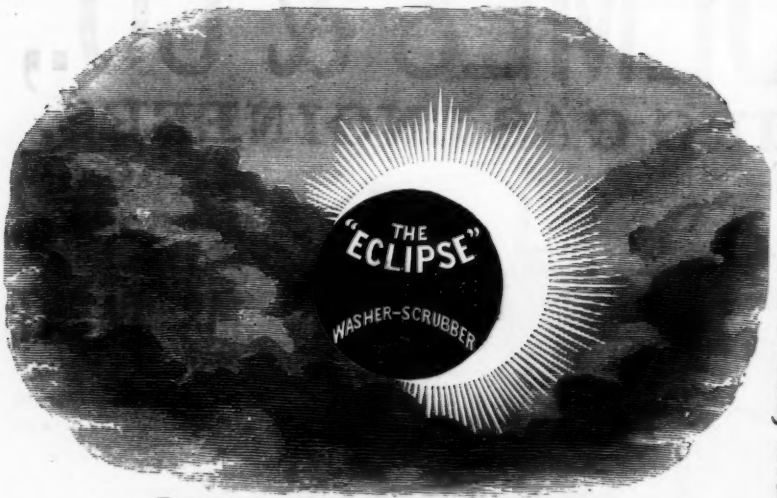


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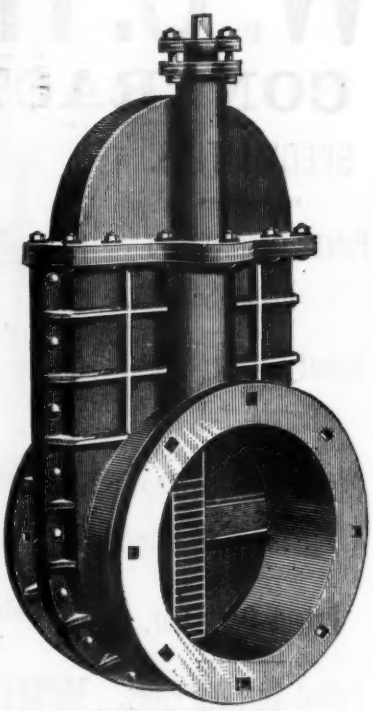

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